

ENVIRONMENTAL STUDIES • SCIENCE

Exploring Environment



BOOK TWO

A TEXTBOOK FOR CLASS IV



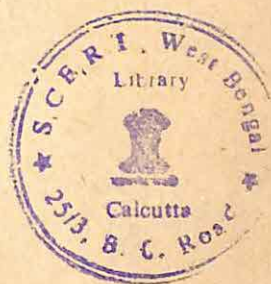
Environmental Studies—Science

Exploring Environment

BOOK TWO

A Textbook for Class IV

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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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Foreword

The textbook entitled *Exploring Environment—Book II* for Class IV is a part of the package of instructional materials in Environmental Studies (Science), envisaged to be developed under the implementation of the National Policy on Education—1986 (NPE) and Plan of Action (POA). The book is based on the detailed syllabi developed as per the guidelines given in the *National Curriculum for Elementary and Secondary Education—A Framework*. It is a part of the series of instructional materials developed for Classes I to V.

The treatment, presentation and the style of the book is in continuation with the earlier textbook developed for Class III. The topics and the content of the book have been woven around situations existing in the child's environment. This has been done to unfold gradually the natural and physical aspects of the child's environment and to acquaint him/her with the basic principles and processes associated with various environmental phenomena. Emphasis has been placed on learning by *doing* and *observation*.

Each chapter in the book is followed by a section entitled 'Test Yourself', containing certain questions to be answered by students. This is followed by another section entitled 'Things to Do', which indicates activities that can be performed by the students either in the classroom or at home to enrich their learning experiences.

The book envisages selection and organisation of teaching-learning activities that would provide opportunities to the learners to explore their environment and to participate in different kinds of activities so as to enable them to think, to question, to experiment and to seek explanations of different environmental phenomena. In this context, the role of the teacher emerges to be very significant. Since the environment and the experiences of the children outside the school vary from place to place, emphasis should be laid on activities drawn from the experience of the children. The activities suggested in the textbook are, therefore,

neither prescriptive nor exhaustive. They may be modified, keeping in view their relevance to the life situations of the learners. The teacher may design different activities depending upon the environmental situations around the school. However, the activities should be in conformity with the learning outcomes expected to be attained by the learners.

The first draft of the book was prepared by Smt. Shukla Bhattacharya, Prof. M.S. Khaparde, Mr M.P. Rastogi and Dr H.L. Sharma of the Department of Pre-School and Elementary Education, NCERT. The draft manuscript was reviewed in a workshop held at New Delhi from 4 to 5 November 1987, and was attended by members of the Advisory Committee, subject experts and the practising teachers. The draft was then re-written and refined in the light of the suggestions made by the above group. Prof. A.K. Sharma, Head, DTESE&SE, critically reviewed and edited the final manuscript from the point of view of both content and language.

I am grateful to Prof. P.N. Dave, Head, Department of Pre-School and Elementary Education for his expert guidance at every stage in the preparation of the final manuscript. I am thankful to Prof. A.K. Sharma, Head Department of Teacher Education, Special Education and Extension Services, for editing the final manuscript. I also wish to express my grateful appreciation of the work done by the participants of the two workshops.

I hope the children, for whom this book has been written, will find it useful and interesting. Suggestions and comments for the improvement of the book would be most welcome. The Council will give due consideration to all such suggestions and comments while revising the present edition of the book.

New Delhi

P.L. Malhotra
Director
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CHAPTER I

Functions of Different Parts of a Plant

You know the different parts of a plant. Most plants have roots, stem, leaves, flowers and fruits. Fruits contain seeds. The root of the plant remains under the ground. The other parts of the plant remain above the ground. Draw a picture of any plant. Observe its various parts and name them. Each part of the plant is important and has different functions. What are the functions of the roots? Let us find out.

Do This Activity

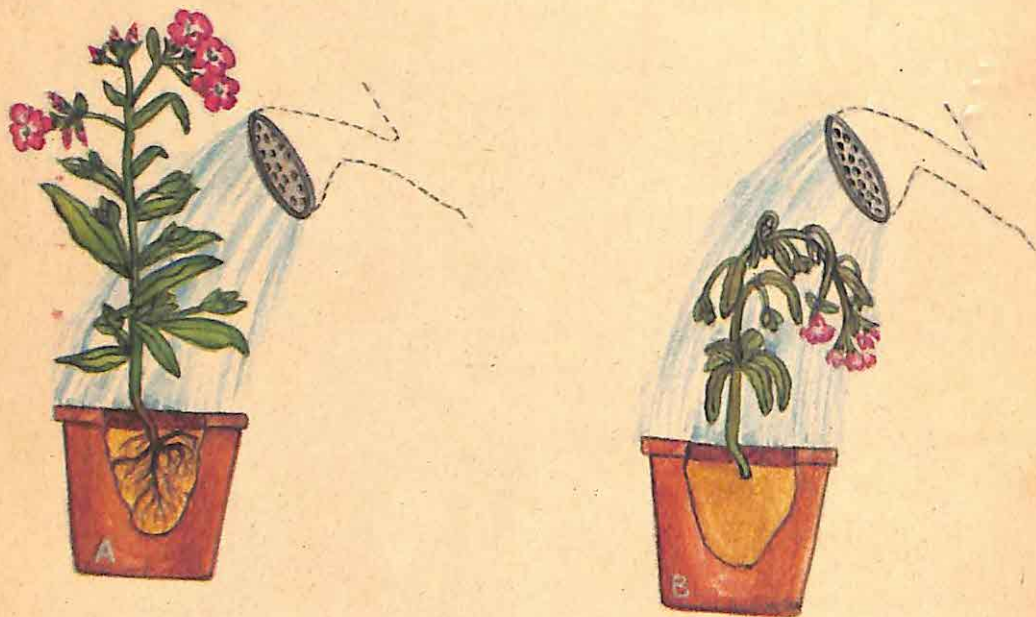
Pull out a young plant from the soil. Can you pull it out easily? You must take care that the roots remain intact. Observe the roots carefully. You will find some bits of soil sticking to the roots. You will find that the roots branch out into the soil. The roots hold the plant firmly to the soil.

What are the other functions of the roots? Let us find out.



Do This Activity

Take two flower pots. Mark them A and B. Fill both of them with garden soil. Take two plants of the same kind. Cut off the roots of one of the plants. Leave the other plant intact. Plant one each in the pots. Water them every day. Observe both the plants after two days. Do you find any change? Note down the changes. Why did the plant without roots wilt?



Roots absorb water and minerals from the soil. How do the water and minerals reach the different parts of the plant?

Do This Activity

Take a plant with a thin and soft stem such as 'Gulmehandi' or 'Sadabahar'. Take care that its roots remain intact. Wash the roots carefully with water. Now take a jar. Fill it with some coloured water. Place the plant in such a way that only the roots remain inside the water. Observe the plant after one or two hours. Observe the roots, stem and leaves of the plant. Why do these parts get coloured?



You have seen in this experiment that when we kept a 'Gulmehandi' plant in coloured water, its stem and leaves got coloured. How did the coloured water get inside the plant? Let us find out.

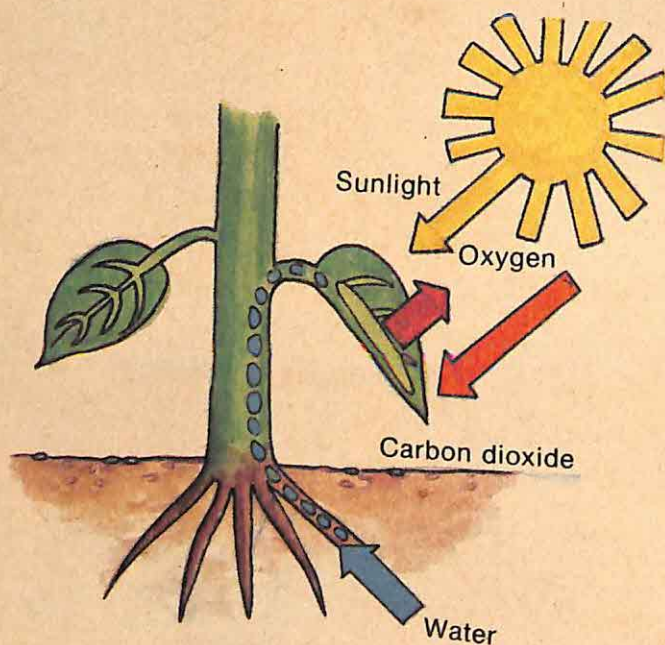
Do This Activity

Cut off with a knife the stem of the 'Gulmehandi' plant, which you have used in the previous experiment. Observe the cut portion with a magnifying glass as shown in the picture.



What do you see? Observe the coloured spots or areas in the stem. The coloured water passes through these areas. It then goes to the different parts of the plant. Thus, the stem helps to carry water and minerals from the roots to the other parts of the plant. The stem also supports the other parts of the plant such as the branches, leaves and fruits.

Observe the stem of some plants and trees grown in your locality. Do all the plants have strong stems? Make a list of plants or trees which have a strong stem and another list of plants which have a weak stem. Do plants with a weak stem stand up firmly above the ground?



What are the functions of the leaves? Leaves prepare food for the plant. For making food, the plants need water, carbon dioxide and sunlight. They also need the green colouring matter which is present in the leaves. This matter is called **Chlorophyll**. In the presence of sunlight and chlorophyll, carbon dioxide and water are converted in the plant into a substance called carbohydrate. During this process of making food, the plants give out oxygen. This process is called **Photosynthesis**. Do leaves have any other function? Let us find out.

Do This Activity

Take a small transparent polythene bag. Tie the bag around a few leaves as shown in the picture. Tie another polythene bag around some leaves which have been coated with vaseline. Observe both the bags after half an hour. Note down the changes. In which bag do you find droplets of water? Where does this water come from?

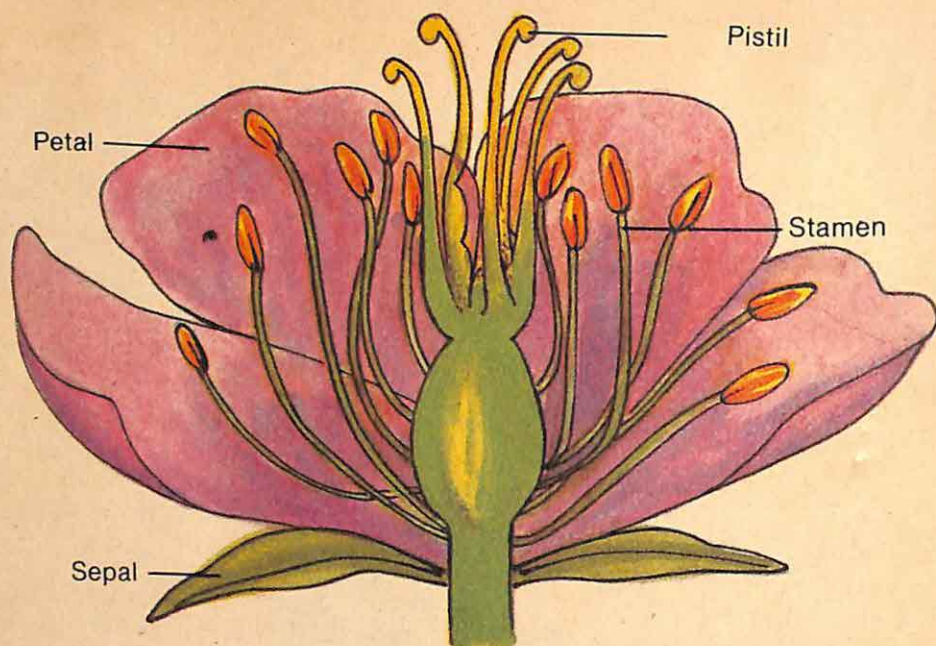


The leaves of plants have tiny pores on their surface. Water comes out from these pores.

You have learnt about the functions of the roots, stem and leaves of a plant. There are some other parts of a plant like the flowers, fruits and seeds. Let us know more about them.

Look at the picture on next page. It shows different parts of a flower.

The outermost part of the flower is the sepal. Sepals are generally green in colour. Next to the sepals are the petals. The petals are generally brightly coloured. Next to the petals, at the centre of the flower, are long



stalks. These are the stamens. They are the organs which contain pollen grains. The innermost part of the flower is the pistil.

Do This Activity

Collect some common flowers from your locality. Study the parts of each flower and describe them.

Do all plants bear flowers? Are all flowers alike? How are flowers useful to the plants? Let us find out.

Do This Activity

Observe different types of plants. If possible, look at the flowers of plants such as the brinjal or bottle-gourd. Watch these flowers for a few days. Note down your observations. What do you find?

You will find that some of the flowers have dried up. If you look carefully at a dried flower, you will see a young fruit growing. Soon the fruit will mature. Cut open such a fruit. You will find that the fruit contains seeds. Seeds are necessary for growing more plants of the same.

type. They give rise to new plants. They store food material which helps in the development of the young plant.

What happens when seeds are planted close together? Let us find out.

Do This Activity

Take a few gram seeds and two pots. Fill the pots with garden soil. In one pot, sow four seeds at a distance of three centimetres from each other. In the other pot, sow about twenty seeds very close together. Water the pots regularly. Observe and record the growth of the seedlings.

If the seedlings are very close to each other, they do not grow well. They do not get enough sunlight, water, and minerals from the soil.

For proper growth of new plants, dispersal of seeds is necessary. How do the seeds disperse?

You must have observed the seeds of Cotton, or *Aak* (*Calotropis*) plants floating in the air. Observe these carefully. You will find that the seed has a hair-like structure. With the help of these hairs, these seeds float in the air. These seeds are carried away by the wind.

In what other ways do seeds disperse?

Look at the picture given below. It shows seeds of some plants. Can you identify them? Also, find out their special features and those which help in their dispersal.



Some fruits such as coconuts are dispersed by water. They develop floating devices in the form of fibrous outer coats. Some seeds and fruits like the poppy and cocklebur have hooks and spines. They stick to the hairy coat of animals and are carried from one place to another by the animals. You must have seen some fleshy fruits like the fig, guava, etc. These fruits also have seeds. Find out how their seeds are dispersed.

Do This Activity

Collect the seeds of some plants. Observe them carefully. Identify them. Note down their names and the characteristics which help in their dispersal. Classify them according to their mode of dispersal, such as by wind, water, animals, insects, birds.

Record your observations in the table as shown below:

<i>Name of the seed/fruit</i>	<i>Special characteristics</i>	<i>Mode of dispersal</i>
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From the above table you will find that fruits and seeds have special features or structures. These structures help the seeds to be easily carried away. Wind, water, animals and insects help in the dispersal of seeds and fruits.

Test Yourself

1. Fill in the blanks with suitable words.
 - i. Roots hold the _____ firmly to the soil.

- ii. Seedlings will not grow properly if they are placed_____to each other.
- iii. Green leaves prepare_____.
- iv. Roots absorb water and minerals from the_____.
- v. For proper growth of new plants_____of seeds is necessary.

2. Given below are some statements. Put a tick (✓) mark against the true statement and a cross (×) mark against the false statement.

- i. Roots prepare food for the plant. ()
- ii. Sunlight is necessary for the leaves to make food. ()
- iii. The stem of a plant absorbs water and minerals from the soil.
()
- iv. Some plants bear flowers. ()
- v. Some fruits do not contain seeds. ()

3. In the following questions, possible answers are given. Put a tick (✓) mark against the correct answer.

- i. Roots absorb from the soil
 - (a) oxygen
 - (b) water and minerals
 - (c) carbon dioxide
 - (d) none of the above
- ii. Food for plants is prepared by
 - (a) green leaves
 - (b) stem
 - (c) fruit
 - (d) flower
- iii. The seeds of 'Aak' (calotropis) are dispersed by
 - (a) wind
 - (b) animals
 - (c) water
 - (d) man

- 4. What are the main parts of a plant?
- 5. What are the functions of the roots?
- 6. Name the animals which help in the dispersal of seeds.
- 7. Name the materials needed in the preparation of food by plants.
- 8. What are the functions of the leaves?
- 9. How are fruits useful to plants?

Things To Do

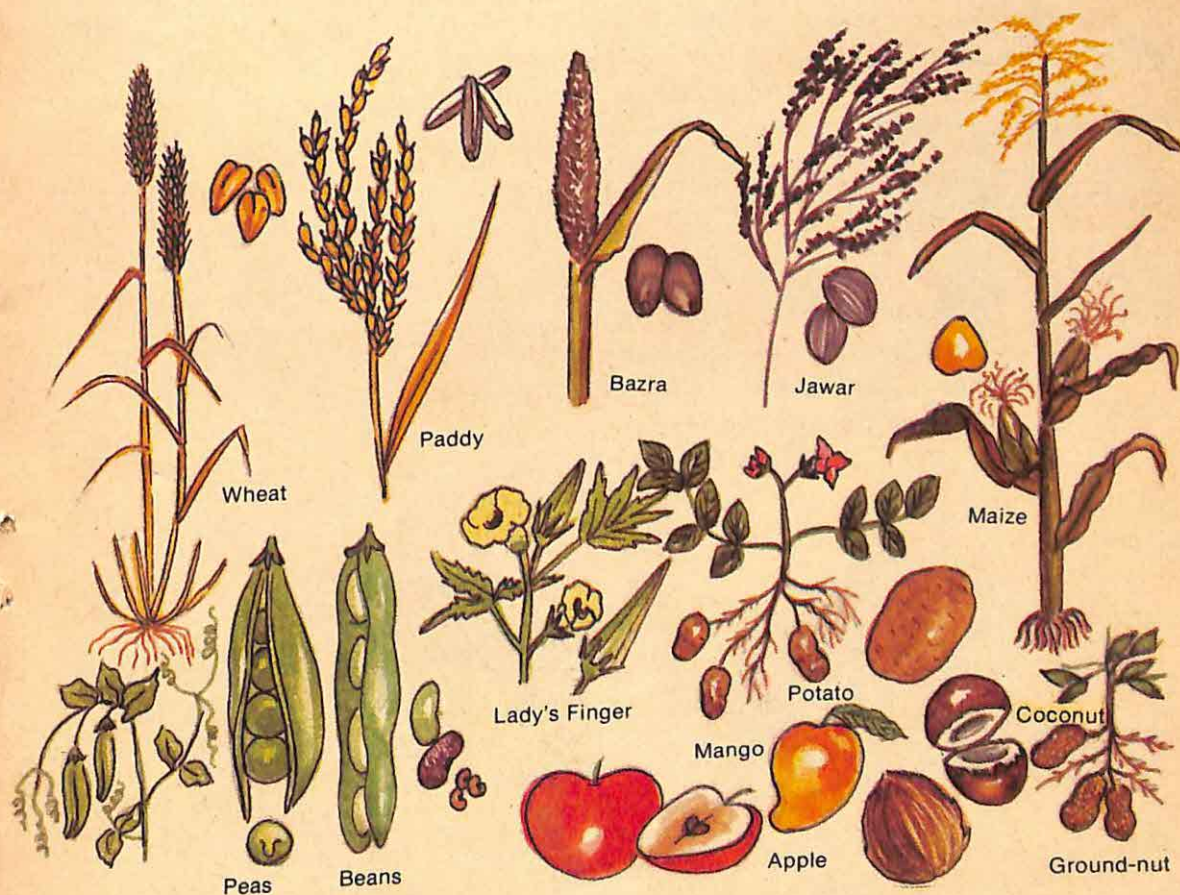
1. Draw a diagram of a plant.
 - i. Show its different parts.
 - ii. Label the different parts.
 - iii. Write the function of each part.
2. Make a chart showing the dispersal of seeds.

Uses of Plants and Animals

You have learnt about different plants and animals which are all around us. Plants and animals provide us with many things that we need. Plants give us a variety of flowers and fruits. Some plants may not have beautiful flowers. Some may not have delicious fruits. Some others may not be shady. But, in general, plants are useful to us in many ways. Let us find out.

Do This Activity

Make a list of some food items that you eat every day. Find out whether the food item is obtained from a plant, or an animal. If it is obtained from a



plant, strike out the name from the list. Now notice how many names are left in the list. Also, look at similar lists prepared by your friends. Find out which items of food are obtained from animals. Milk, eggs and meat are provided by animals. But remember that these animals need plants for their food.

Look at the picture on page 11. It shows some plants and the food-stuffs which we get from them.

Plants like wheat, jawar, bajra, maize and paddy produce grains. These grains are used as *cereals*. Cereals form a major portion of our food. Peas, beans and various 'dals' are known as *pulses*. Vegetables like lady's finger, potato and fruits like apple, guava and mango also come from plants. Oils like mustard oil, ground-nut oil and coconut oil are also part of our food. They also come from plants. They are called vegetable oils. Do you know why we call them vegetable oils?

Animals in a dairy farm or a poultry farm are given special foods. Ask a farmer about these foods. Most of these foods which are used as fodder for cattle and as poultry feed are obtained from plants. Plants are the main source of food for all human beings and animals.

Besides the use of plants as food, they are also useful in many other ways. Let us find out some more uses of plants.

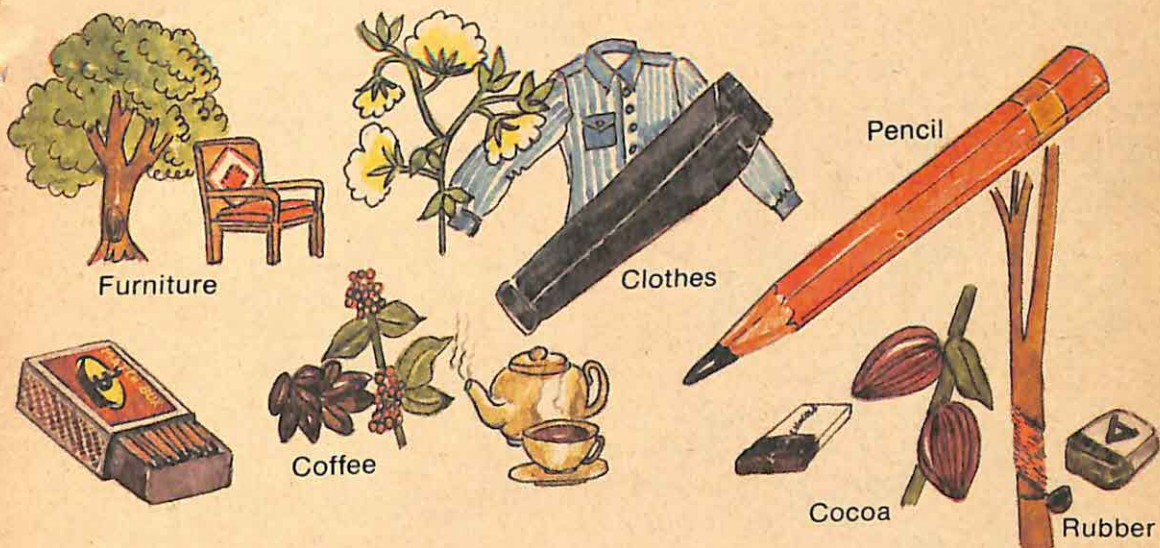
Do This Activity

Look carefully at the various objects used in the kitchen, farm and workshop. Then prepare the following lists:

- i. Wooden objects used in kitchen
- ii. Tools and implements made partly of wood
- iii. Farm equipment made of wood
- iv. Objects made partly or wholly of wood, such as pencil, match-sticks and match-box.



You will notice that even the construction of a house needs wood. We need wood for making furniture. Some tools and implements like a hammer, spade, etc. also require wood. Where does all this wood come from? All varieties of wood are not equally good for making furniture. Some kinds of wood are used for preparing boxes to store fruits and vegetables. The wood of Sheesham, Sagwan and teak trees makes good furniture like tables and cupboards. Some varieties of wood are used as common fuel. Some are used in making match-sticks and pencils. Imagine how many plants have been used to provide for these materials.



Are there any other uses of plants?

Some plants and the products obtained from them are used as medicines. Find out the uses of some of these medicinal plants.

Do This Activity

Collect information about five medicinal plants grown in your locality. Find out which part of the plant is used as medicine. Record your observations in the table, as shown below:

S.No. Local name of the Medicinal Plant	Medicinal part of plant : Root/Stem/Leaf/Flower/ Fruit/Seed	Uses
---	---	------

- 1.
- 2.
- 3.
- 4.
- 5.

Some people use 'Tulsi' leaves as a medicine when they have a cough and cold. Tulsi leaves also have many other medicinal uses. The extract of 'Banafsa leaves' is also used for treating colds and coughs. 'Neem' is used as medicine for skin diseases. Like these, there are many other medicinal plants. In our country plants have been used to treat diseases from ancient times. This system of medicine is called 'Ayurveda'. *Dhanwantari*, *Nagarjuna* and *Charak* were famous ancient experts in Ayurveda. Even today we have many experts in Ayurveda. Many people use the Ayurvedic system of medicine in our country.

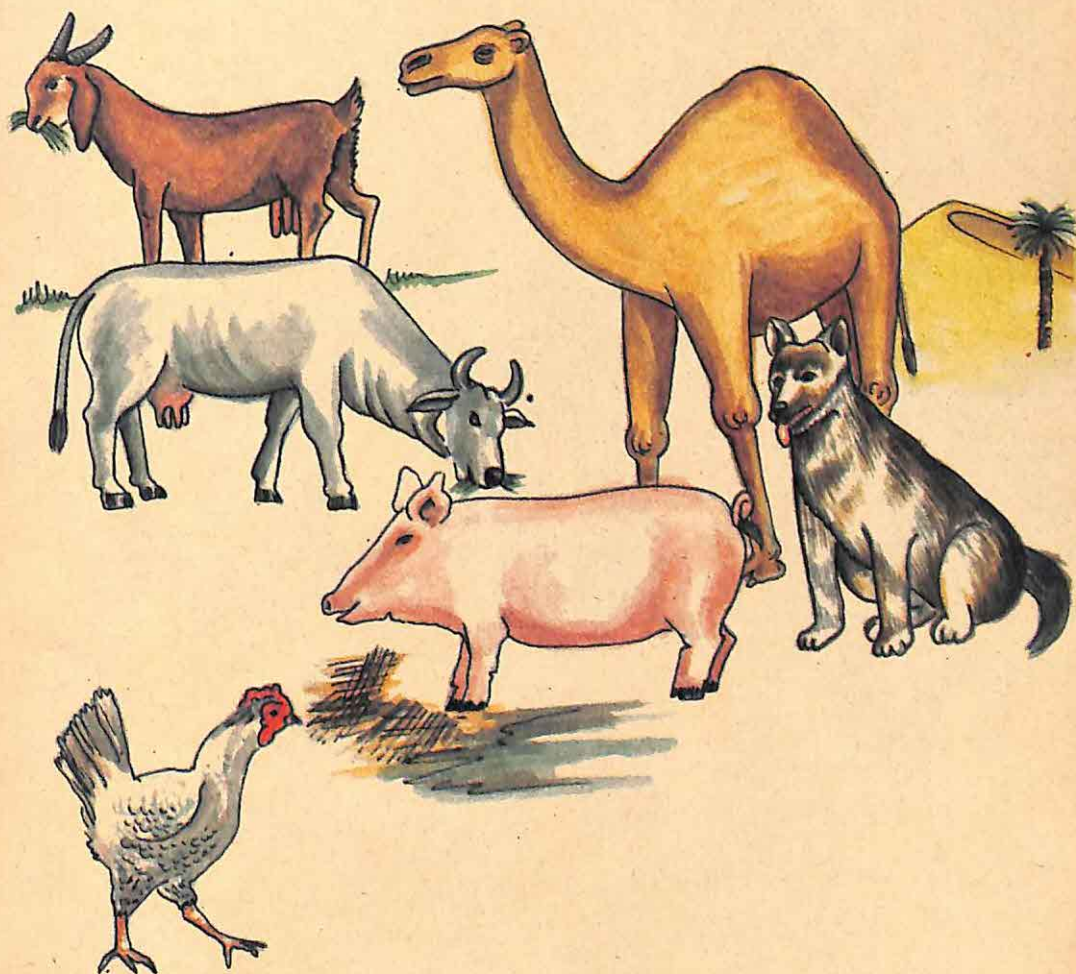
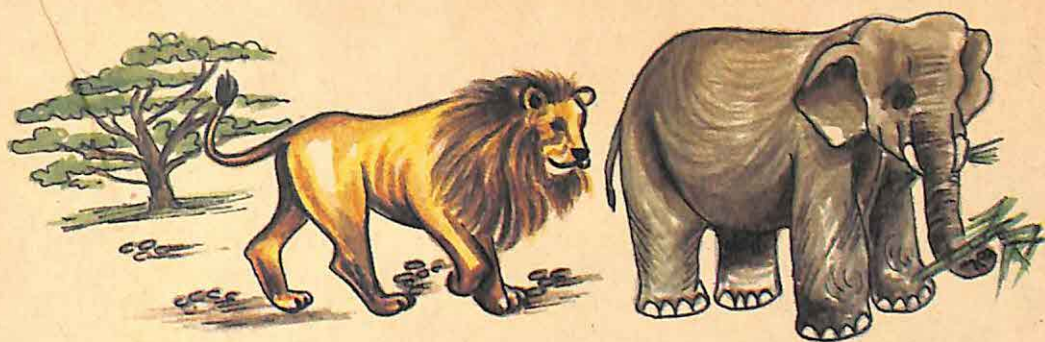
Plants are also useful in other ways. Some plants are used to make paper and cardboard. The leaves and flowers of some plants are used in preparing scents and perfumes. We get gum and resins from some plants. Plants also give us many other useful products.

Even plant wastes are useful. They make good manure. The manure helps other plants and crops in their growth. So you see, that plants play a very important role in our lives. Do animals also play an important role in our lives?

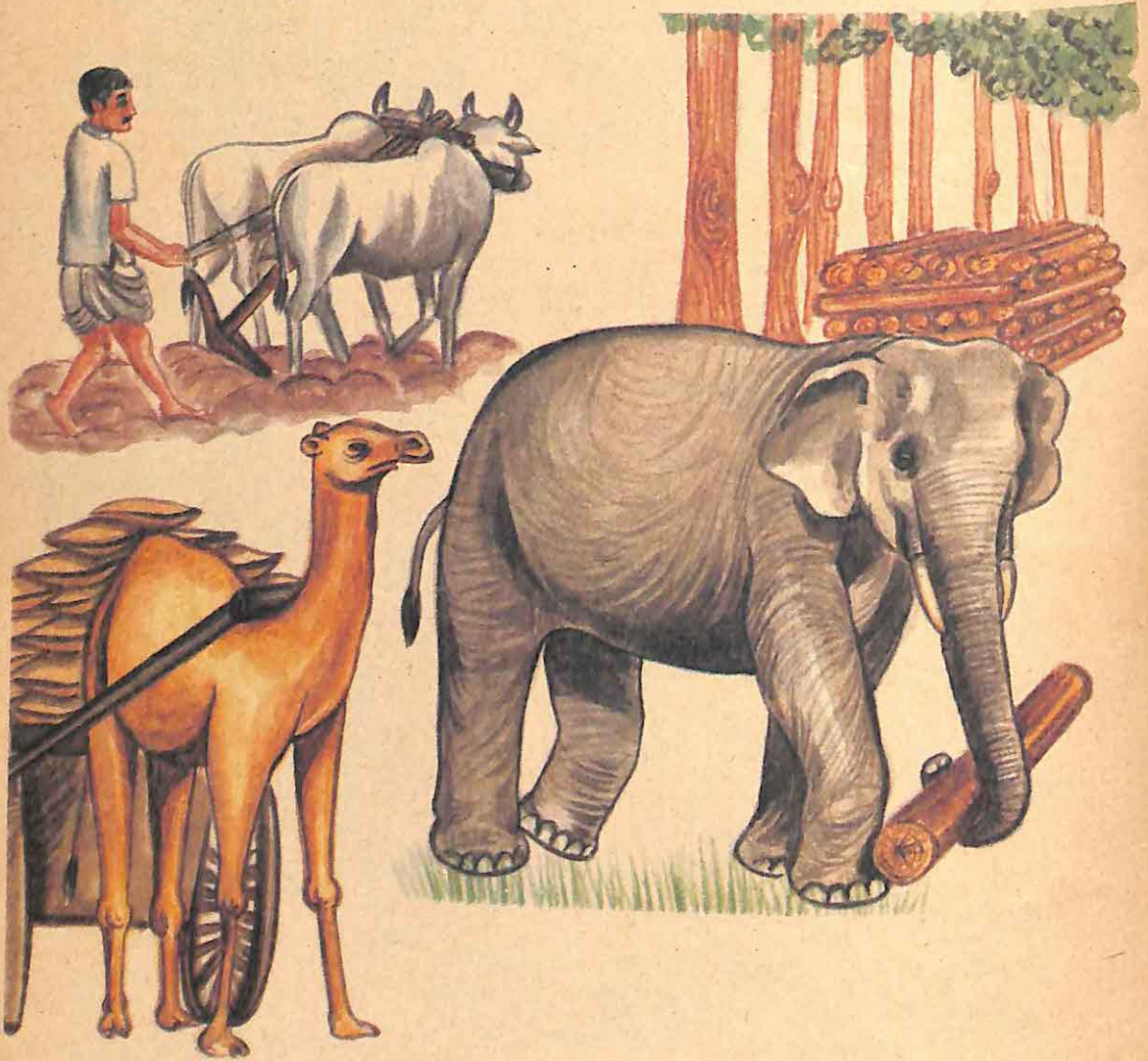
Look at the picture on page 15. Name the animals that give us some food. Name the food we get from these animals.

List some more animals that provide us food. Do you know that the milk of goats and camels is also used as food in some parts of our country?

You have seen elephants, horses and dogs. In what way do these animals help us? Look at the picture. Find out how these animals are used.



Like bullocks and horses, camels and elephants are also useful in carrying loads. In deep forests, trained elephants are used to carry heavy logs of wood. Camel-carts are used in many parts of the country. These carts can carry more load than bullock-carts.



Some animals are called farm animals. Why are they so called? Can you name some farm animals?

Apart from the above, in what other ways are animals useful to us? We wear woollen and silken clothes. The fibres of wool and silk are not

obtained from plants. Animals like the sheep and yak give us wool. Silk fibre is produced by a small insect called the silkworm. Name some of the things which are made of wool and silk.



Silkworm



Yak



Sheep

From ancient times, man has used animal skins to cover himself. Animal skins are used even today. The skin of dead animals is cured to make leather. Find out the articles we use which are made of leather. The skin of some animals like rabbits has soft, delicate hair. It is used to make fur caps, fur coats, etc.

As the plant wastes make manure, animal dung and the bones of dead animals also make good manure.

Thus, you have learnt that plants and animals provide us with many useful things. That is why they are called our natural resources. Therefore, we must take care of our animals and plants. They need our care and protection. This is important not only for our present but also for our future.

Test Yourself

1. Fill in the blanks with suitable words.

- i. Plants are the main source of our _____
- ii. Dairy animals get their fodder from _____
- iii. Plant wastes make good _____ provide us wool
- iv. Animals like _____ and _____
- v. Silk fibre is produced by a small insect called _____

2. Given below are some statements. Put a tick (✓) mark against the true statement. Put a cross (X) mark against the false statement.
- Plants are not the main source of our food.
 - We get wool from buffaloes.
 - The dead parts of plants are of no use.
 - Plants and animals need our care and protection.
 - The skin of some animals is used as leather.
3. In the following question possible answers are given. Put a tick (✓) mark against the correct answer.
- We get wood for furniture from
- trees like Sheesham , teak and Sagwan
 - cotton, mustard and groundnut plants
 - rose, jasmine and banana plants
 - none of the above
4. How do animals depend on plants?
5. Name three plants:
- Which are used as cereals?
 - Which are used as fodder for animals?
 - Which provide wood for furnitur?.
 - Which are used as medicines?
6. Name some animals which help us in farming.
7. What things are made of leather?
8. What will happen if,all plants and trees are destroyed?
9. Given below is a list of some of the things which we get from plants and animals. Write down the name of the plant or animal from which we get them.

S. No.	Thing	Name of the plant/animal
1.	Sugar	
2.	Cotton	
3.	Oil	
4.	Wool	
5.	Fur	
6.	Silk	
7.	Eggs	

CHAPTER 3

Care and Protection of Plants and Animals

We depend on plants and animals for many useful things. But do you know that plants and animals also depend on each other? In what way are they dependent on each other? The picture given below shows how animals depend on plants for food.



The flesh eating animals such as the tiger and lion, eat mainly plant eating animals. Man depends on both plants and animals for food. From where do plants get their food?

You know that all green plants make their own food. What happens to the food prepared by plants? Plants use a part of this food. The rest of it is stored in the plant. Human beings and animals use this food. While making food, plants take in carbon dioxide from the air. They give out oxygen. This process is called photosynthesis. Oxygen is very useful to us. You know that we cannot live without air. The air we breathe in contains more oxygen. The air we breathe out contains more carbon dioxide than oxygen. Like us, all living things need oxygen. The green plants help to maintain oxygen in the air. Study the picture given below. It shows how plants and animals including man, help to keep the level of oxygen and carbon dioxide in the air. To keep this balance, all plants and animals need care and protection.



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What would happen if there were no green plants in this world?

For many, many years human beings have reared useful plants and animals. Now we will learn why we should take care of all animals and plants. Let us first learn about the care of plants.

Do This Activity

Take two potted plants of the same kind. See that they are of the same size. Mark the Pots A and B. Water the plant in Pot A. Do not water the plant in Pot B. Record the changes you see in both plants for a week. What difference do you find?

Why has the plant in Pot B dried up?

Timely watering of plants is necessary for their growth. Plants also need manuring and the right kind of soil. You will learn about it in the later chapters.

For proper growth, plants need to be protected against extreme cold and heat. If possible, visit a nursery. Find out how the young seedlings are protected against extreme heat and cold. In northern India, sometimes crops are damaged due to severe cold.

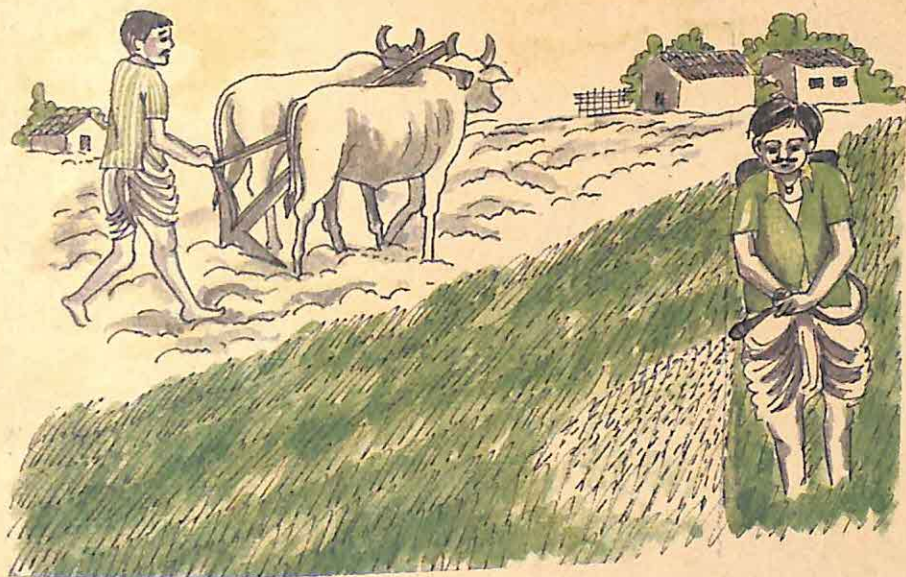
What will happen if plants do not get enough sunlight?

Do This Activity

Take two potted plants of the same kind. Mark them A and B. Keep the plant in pot A in complete darkness. Keep the other plant in sunlight. Water them regularly. Observe the plants for a week. Compare the growth of the plants after a week. Which of the plants shows better growth?

Timely watering, manuring, sufficient sunlight and the right temperature are necessary for the proper growth of plants.

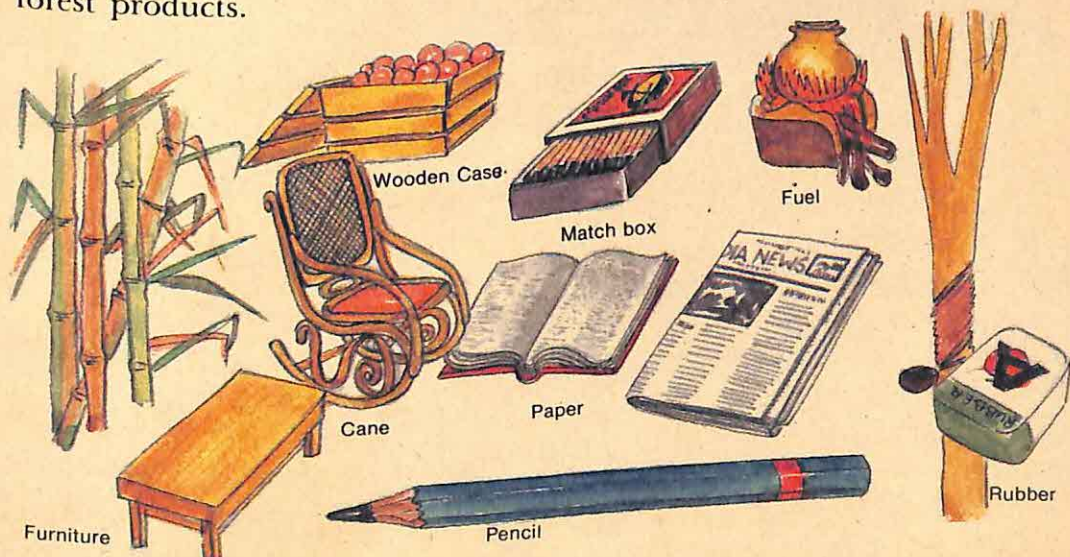
Plants also need care against pests and diseases. If possible, visit a farmer. Find out which type of pests and diseases damage the crops. Find out from him the different ways of protecting plants against insects and pests. One of the ways of protecting plants against these are shown in the picture.



Stored grains and other crops are damaged by moulds, insects, rats and other pests. Food grains have to be protected against these pests. **Pesticides** and **Insecticides** are used to protect them.

Man takes care of the plants cultivated by him. He also protects them against diseases and pests. But how can we take care of all the other plants?

You know that forests give us many useful products. Name some of the products obtained from the forests. The picture given below shows useful forest products.



Forests also give shelter to many animals. Forests are useful to us in many other ways. You will learn about their uses later. Many animals live in the forests. Our country has rich, beautiful forests. But there has been destruction of our forests. There are many reasons why the forests were destroyed. As our population increased, forests were cut down to make space for buildings, new towns and industries. More land was needed to grow food. Man needed more and more timber. He also needed more and more other forest products. Therefore, the trees were cut down in great numbers.

No new trees were grown in their place. The forests were destroyed. The destruction of forests created a lot of problems. The picture below shows some harmful effects of the destruction of forests.

We are now taking steps to protect our forests. What are these steps? You must have participated in the *Vanamahotsava* celebration in your school. Every year, thousands of trees are planted during the 'Vanamahotsava' or forest week. You can plant saplings of trees in your school compound. You can also do so in the free land in the area where you live. Take care of these saplings. Let them grow with you. Soon you will have beautiful, shady trees. Help your parents and friends to grow trees.

In our country we have also launched social forestry programmes. People are being made aware of the importance of forests. Find out about such a programme in your locality. Also find out what activities are undertaken in this programme. Planting trees on the road-side and along the fields provides shade. It makes the surroundings beautiful. It also helps to keep the air fresh. Do you know how?

Some of the steps to be taken for protecting the forests are:

- avoiding thoughtless cutting down of trees.
- protecting forests from fire.
- protecting plants against diseases.
- planting more trees.

Like plants, animals also need care and protection. Man takes care of his domestic and pet animals. How do you take care of pet animals? Visit a dairy or poultry farm, if possible. Find out how the owner takes care of these animals. Observe the place where the animals are kept.

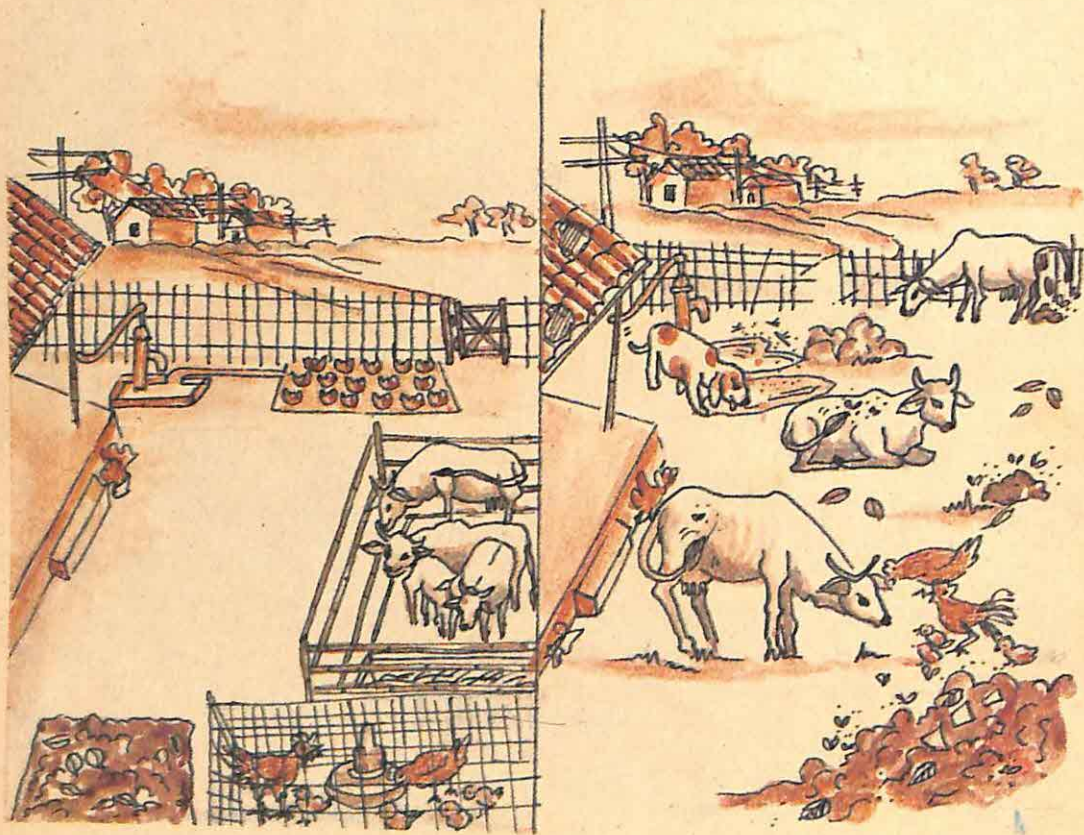
Animals need food, shelter and safe drinking water. They should be groomed and cleaned. Their sheds should be kept clean. Whenever an animal gets sick, it should be treated. There are special hospitals for animals. These are called veterinary hospitals.



Harmful effects of the destruction of Forest



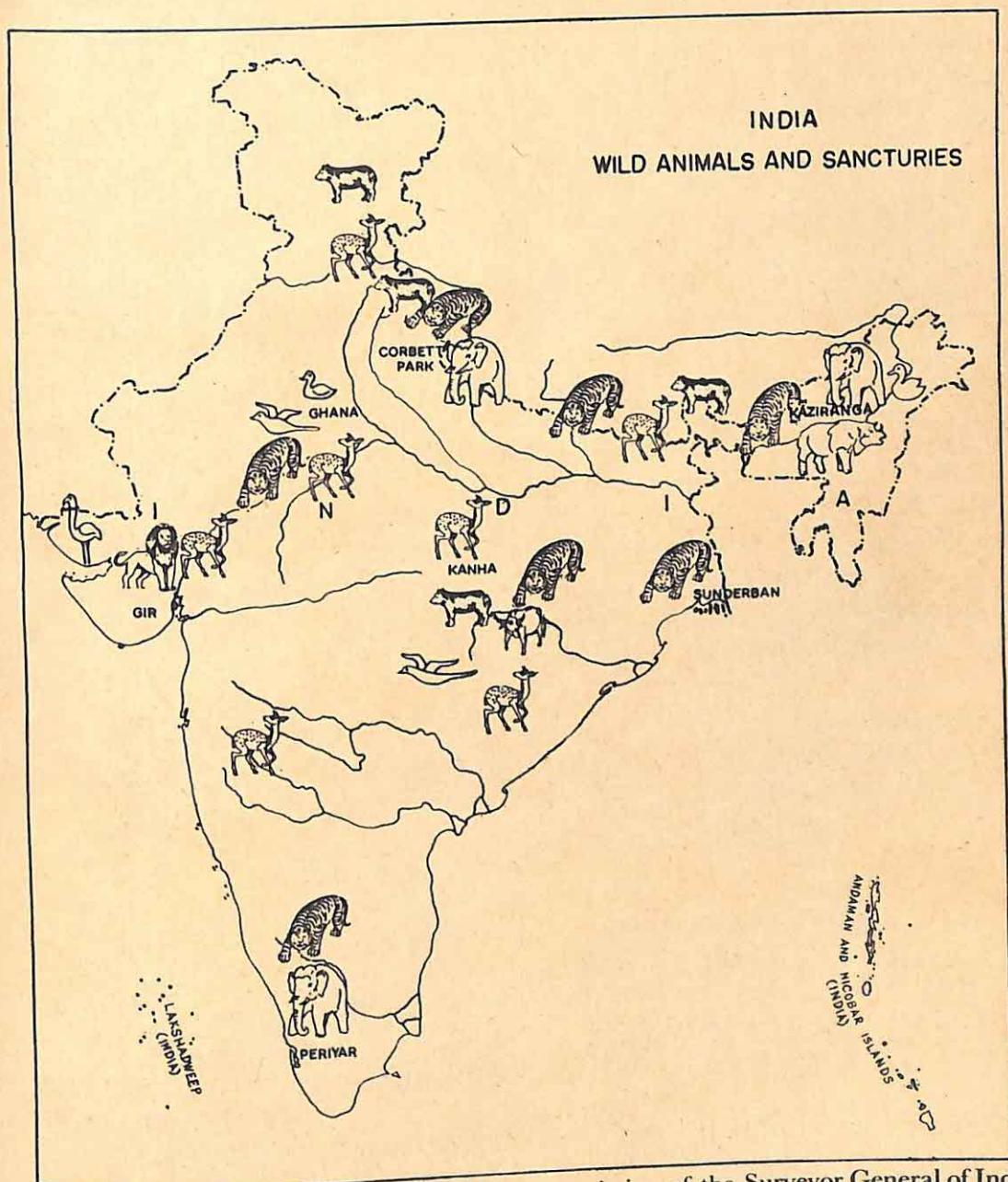
If we keep the surroundings clean, it will prevent the spread of diseases. Animal wastes such as dung, urine, decaying fodder can be dumped in a compost pit. These can also be used to get *gobar* gas. Compare the two pictures given below. Where do you think the animals will remain more healthy?



Many animals are found wild in nature. They too, are useful for us. Man has been hunting these wild animals for many years. The skin of animals like tigers, cheetah deer, snakes is very valuable. Some animals are also hunted for their meat. Today, many wild animals are dying out. Unless these animals are protected, they will be lost forever. The destruction of forests has also affected these animals. Their natural shelter and food chain has been disturbed.

Recently we have taken steps to protect our wild-life. Many **National Parks** and **Wild-Life Sanctuaries** have been set up. Study the map of India.

It shows some of the important wild-life sanctuaries in our country.



Based upon Survey of India map with the permission of the Surveyor General of India. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. © Government of India copyright, 1988

The names of some important sanctuaries are given below.

<i>Sanctuary</i>	<i>State in which located</i>
Corbett National Park	Uttar Pradesh
Kanha National Park	Madhya Pradesh
Hazaribagh National Park	Bihar
Kaziranga National Park	Assam
Bharatpur Bird Sanctuary	Rajasthan
Bandipur National Park	Karnataka
Madhumallai National Park	Tamil Nadu

Find out about other National Parks in our country. Take the help of your teacher and parents. We have laws to protect our wild-life. We must respect these laws. We must not hunt animals for fun or for their skins. You know that the tiger is our national animal. The peacock is our national bird. Do you know why the tiger is called our national animal? It is a protected animal. We are not allowed to kill tigers.

It took millions of years for our wonderful world to evolve. There are many varieties of plants and animals. We must take care that they do not get destroyed. These are our great wealth.

Test Yourself

- Given below are some statements. Put a tick (✓) mark against the correct statement and a cross (X) mark against the wrong statement.
 - Green plants make their own food.
 - Extreme cold is good for the growth of plants.
 - Plants give out oxygen while making their food.
 - Animal wastes are used in getting *gobar* gas.
- Fill in the blanks with suitable words.
 - Plants get _____ from the air for making food.
(oxygen, carbon dioxide)
 - The air we breathe out contains more _____.
(carbon dioxide, oxygen)
 - Sick _____ are treated in veterinary hospitals.
(plants, animals)
 - National Parks and sanctuaries are places where wild animals are _____.
(hunted, protected)

- v. Plants need protection against _____ and pests.
(diseases, insecticides)

3. Match the items in Column I with items in Column II

I

II

- | | |
|--------------------------------|--------------------------------|
| i. Trampling of plants | a. proper sanitation |
| ii. Plants kept in the dark | b. deforestation |
| iii. Domestic animals need | c. damages the plants |
| iv. Pollution of water and air | d. do not grow well |
| | e. is harmful to living things |
| | f. only safe water |

4. Parts (i) to (iii) of this question have four alternatives. Only one of them is correct. Put a tick (✓) mark against the correct answer.
- i. We should protect plants and animals because
- they are beautiful to look at
 - add to the beauty of the surroundings
 - maintain balance in nature
 - they are useful for our food
- ii. Green plants make their food in the presence of
- sunlight, water, carbon dioxide
 - oxygen and water
 - water and carbon dioxide
 - none of the above
- iii. Watering and manuring are necessary for the growth of
- crops
 - animals
 - insects
 - none of the above
5. State the conditions necessary for the growth of plants.
6. What will happen if the sheds of animals are not kept clean?
7. What steps would you take to protect animals and plants against diseases?
8. Name two important ways of protecting our wild animals.
9. Give two harmful effects of thoughtless cutting of trees.

Things To Do

- Plan a programme of planting trees with your friends. See that all these plants grow.
- Collect information about different National Parks and Wild-life Sanctuaries of our country. Take the help of your teacher.
- Collect information about the diseases of crop plants such as wheat, paddy, etc. Find out the ways to prevent these diseases.

CHAPTER 4

Our Body and Its Functions

All of us have similar parts of the body as seen from outside. However, each of us differs from others in the shape and size of the parts of our body. All of us also have similar organs inside our body. The parts inside the body are called internal organs. What are the different organs that are present inside our body? What are their functions?

Do This Activity

Feel the different parts of your body. Which are the parts that are fleshy and soft? Which are the parts that are hard? Some parts of your body feel hard. Here, there is the less flesh. Some other parts feel soft. Here the flesh is more. The flesh is made of muscles. Find out which parts of your body have more muscles.

Are there only muscles in the body? Let us find out.

Do This Activity

Press on the different parts of your body with your fingers or hand. Press on your head, chest, back, leg and arm. How do you feel? You feel that inside these parts of your body there is something hard. The hardness you feel is because of bones. Your body has a particular shape. Bones and muscles give shape to your body. The bones also protect the internal organs of your body. Imagine what would happen if all the bones of your body were removed?

You can walk, run, bend and do many activities. What makes it possible to move your body? Muscles and bones help you to move your body. In how many directions can you move your body?

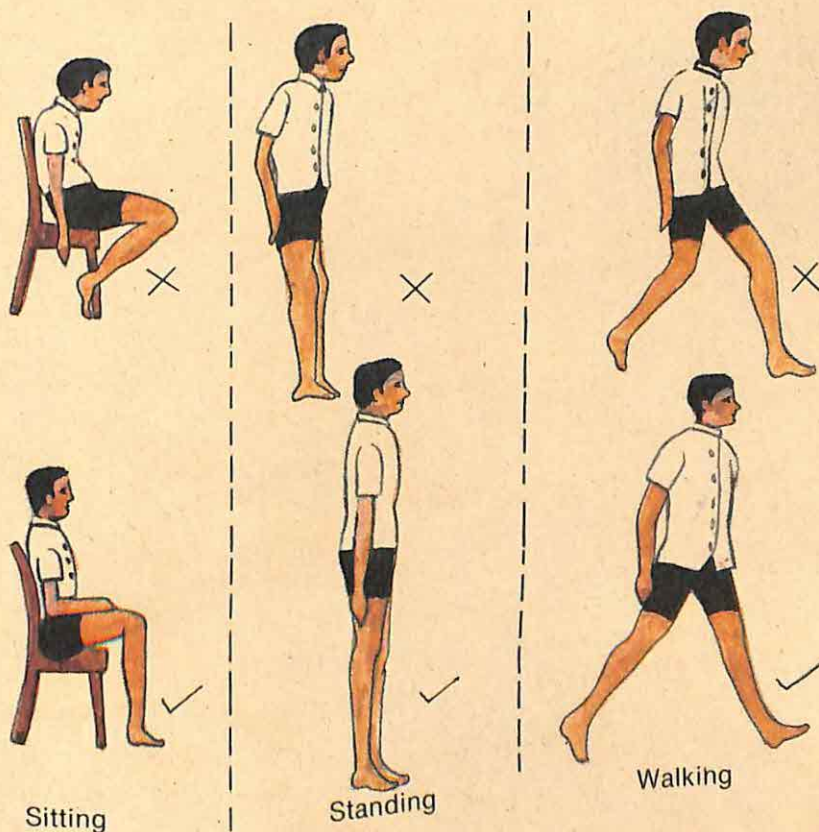
Do This Activity

Move your arm at the wrist, elbow and shoulder. Move your leg at the ankle, knee and hip. Bend down and observe your backbone. Move your fingers. Move your neck.

In how many directions can you make the movement at a particular point? Record your observations in a table as shown below:

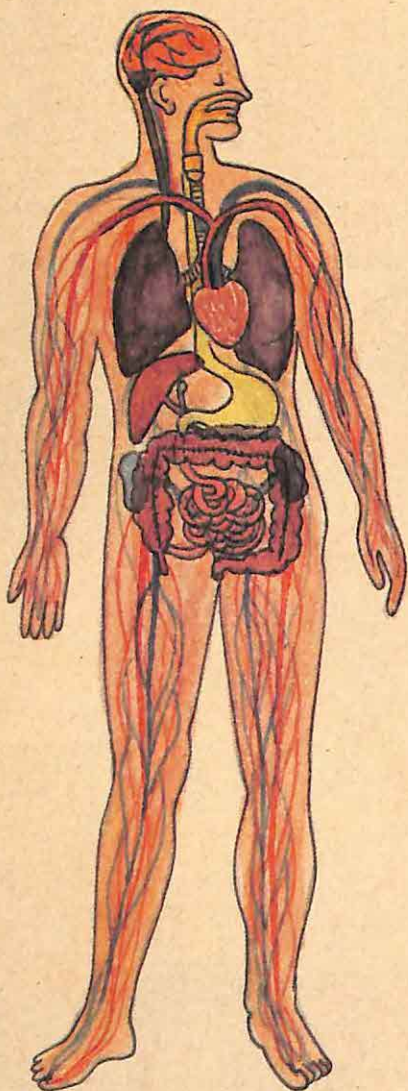
Body parts	Movement possible	
	In one direction only	In all directions
1. Wrist		
2. Elbow		
3. Shoulder		
4. Fingers		
5. Knee		
6. Neck		

To keep your muscles and bones healthy, it is necessary to do regular exercise. Regular exercise keeps your muscles strong. It is also important to maintain a correct posture of the body. Poor posture of the body leads to



defects. It is important to walk, sit and stand correctly. Sitting erect keeps your backbone straight. The correct postures for sitting, walking and standing are shown on page 31. Try to follow the correct posture for doing different kinds of work.

You have learnt about the bones and muscles. Let us now study some internal organs of our body and their functions. Some of the internal organs are the brain, heart, lungs, liver, stomach and kidneys.



Do This Activity

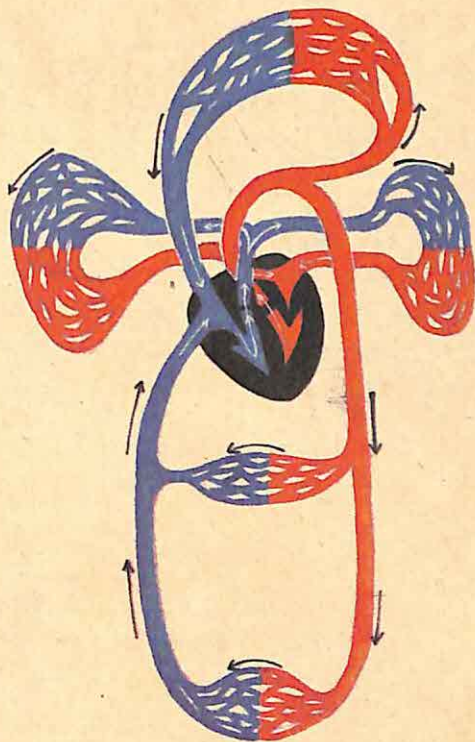
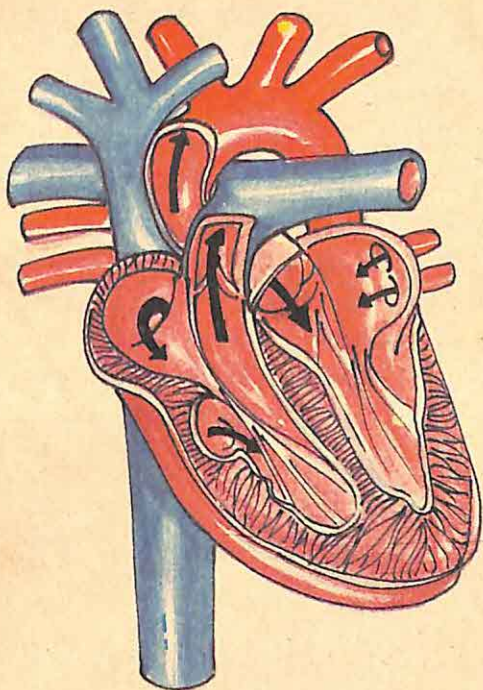
Look at the picture given here. Find out the location and shape of the internal organs.

What does the heart do for our body? What is it made up of?

Do This Activity

Observe the picture on the next page. It shows the heart and the blood vessels. Note the main type of blood vessels.

The heart is made up of muscles. The heart pumps blood to all parts of the body. There are two types of blood vessels. One set of blood vessels carries blood from the heart to all parts of the body. The other set of blood vessels brings blood back from the different parts of the body to the heart. How does the heart work? Let us find out.



Do This Activity

Place your palm over your chest. Can you feel something beating? Ask your friend to apply his ear to your chest.

Your friend will feel the beating of your heart. Feel the heartbeat while resting, walking fast and running. Is there any difference in the heartbeat in these three cases? The heart pumps blood faster when you work hard or run. Your heart beats all the time. It works as long as one lives.

You can also feel your heartbeat at some other spot in your body. One such spot is at your wrist.

Do This Activity

Place the first two fingers of your hand on the wrist of the other hand as shown in the picture.

Move your fingers slightly to get the correct spot. Do you feel something beating? This is your pulse. If you are not able to feel

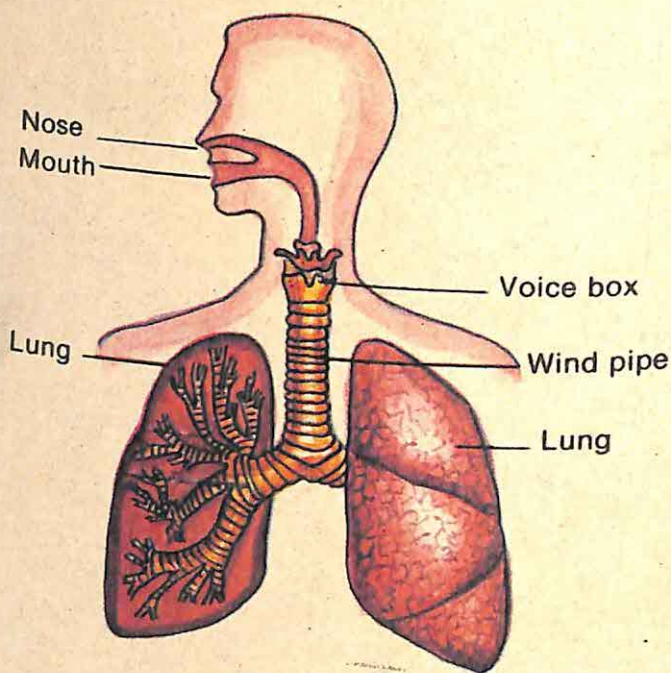


the pulse yourself take the help of your teacher. Now run or jump for some time. Again, feel your pulse. Does it beat faster?

You also know that you cannot live without air. We get air into our body while breathing. How does it reach inside our body?

Do This Activity

Close both your nostrils with your hand. How do you feel? Now release your hand. Put your hand on your chest and take a deep breath. Then, breathe out. Observe the movement of your chest while breathing. Look at the picture below. It shows the organs which help in breathing.



The air enters through the nostrils into the windpipe. From the windpipe it enters both the lungs. The hair in your nose prevents the dust particles from entering the lungs. The nose and windpipe also warm up the air before it enters the lungs. When you breathe in, the chest and the lungs expand. When you breathe out, they contract. In a crowded room with closed doors and windows, you may find it difficult to breathe. You feel uncomfortable. Do you know why? This is because no fresh air enters the room. Most of the oxygen gets used up. Thus, the air in the room has less

oxygen and more carbon dioxide. You should, therefore, allow sufficient fresh air to enter your living room. Always try to breathe through the nose. Keep the nostrils clean. Some children breathe through the mouth. This is harmful. Do you know why?

Your body also needs energy to do work. Food gives us energy to do work. The oxygen we breathe in, helps to burn the food to give energy. The food we eat cannot be used by our body as such. It must be changed into a simple soluble form. This process is called digestion. How does the food get digested inside our body?

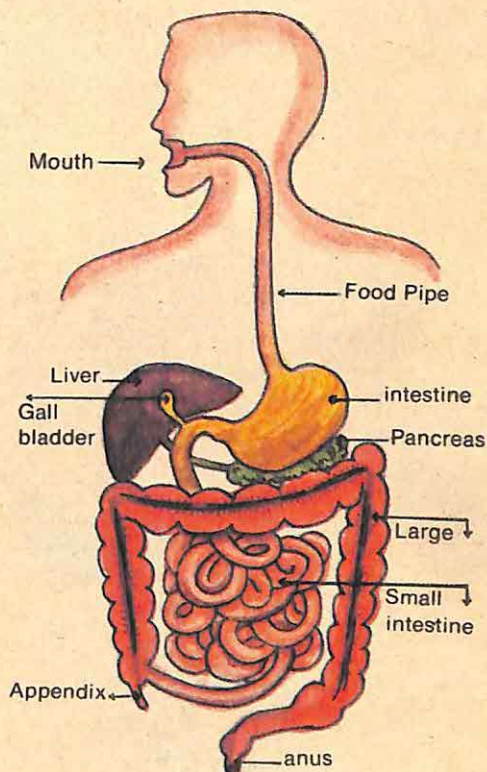
Do This Activity

Take a piece of chapati and chew it for some time. Keep it in one corner of your mouth. Is there any change in the taste? Look at the picture. It shows different organs that help in digestion.

When you chew the food, it gets broken down into very, very small pieces. It also gets mixed with the saliva from your mouth. The process of digestion of food begins in the mouth. After the food is swallowed, it goes down into the stomach. The stomach contains digestive juices. Here, the food is mixed with these digestive juices. It is further digested here. Then it enters the intestine. In the intestine, the food gets mixed with other

digestive juices. The digestion is completed. The juices from the liver and pancreas help in the process of digestion. The digested food is absorbed in the intestine. The undigested food passes out of the body as faecal matter.

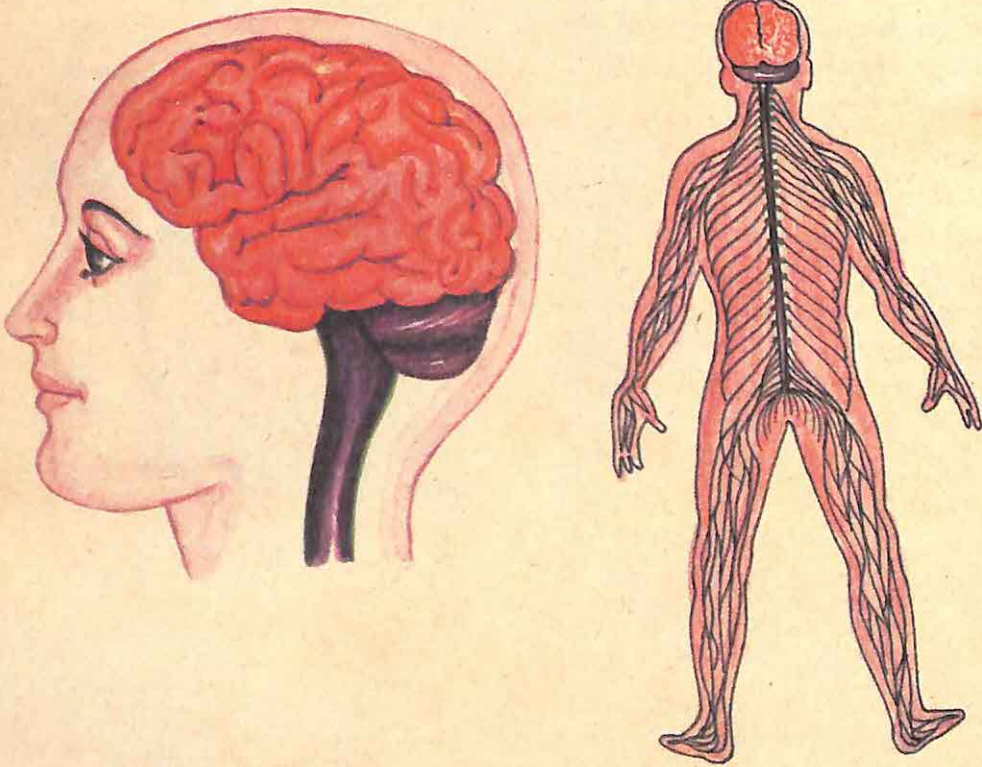
To keep healthy, you must follow certain eating habits. Eat at regular intervals. Chew the food well. Chewing helps in digestion. Avoid eating when you are too tired. Do not run or do heavy exercise just after eating.



Observe the picture of the internal organs given earlier. Find out the location of the kidneys. The kidneys help to remove the wastes from the blood. The wastes pass out of the body as urine. You should drink a sufficient quantity of water every day. It helps the kidneys to function properly.

You have learnt that the heart pumps blood to all parts of the body. The kidneys help in removing the wastes from your body as urine. The lungs help in supplying oxygen to your body and removing carbon dioxide. The stomach and intestine help in the digestion of food. How do these organs work? What will happen if any one of these organs stops functioning? Is there any organ in your body that controls the working of the other organs?

All the functions of the body are controlled by the brain. It works through a system of nerves. Nerves are like tiny electric wires. These



connect the brain to all parts of the body. The picture shows the brain and the nerves of the body. You will learn more about it later.

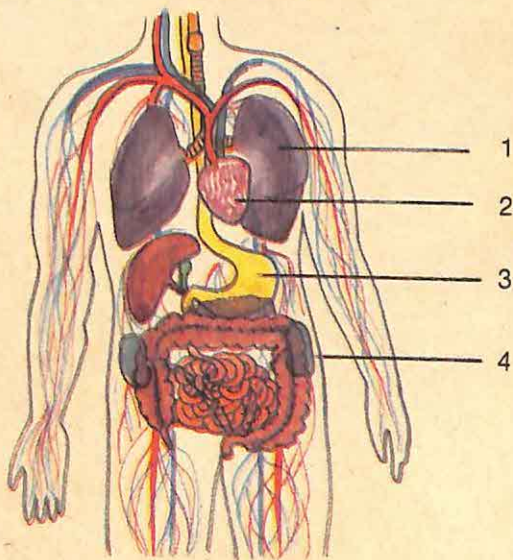
To keep yourself healthy and fit you should take care of your body.

Test Yourself

1. Which one of the following explains the process of digestion?
 - i. cutting food into smaller parts by the teeth.
 - ii. breaking food into a simple and soluble form.
 - iii. absorbing food into the body.
 - iv. mixing food with digestive juices.
2. Write the following statements in a proper sequence which will explain the process of breathing.
 - i. air rich in oxygen enters the windpipe.
 - ii. air rich in oxygen enters the lungs.
 - iii. air rich in carbon dioxide is given out of the lungs.
 - iv. air rich in oxygen enters the nostrils.
3. In which of the following cases does the heart beat faster?
 - i. a boy who is running.
 - ii. a boy who is sleeping.
 - iii. a boy who is walking.
 - iv. a boy who is reading.
4. Given below are some statements. Put a tick (✓) mark against the correct statement and a cross (X) mark against the wrong statement.
 - i. The air you breathe in is rich in carbon dioxide.
 - ii. By counting the pulse you can know the rate of the beating of the heart.
 - iii. When you breathe in your chest expands.
 - iv. The heart pumps blood to all parts of the body.

5. In the picture the numbers indicate certain important internal organs. Select the correct name and write it against the number given :

Lung, Stomach, Kidney, Heart



6. Fill in the blanks.
- The hair in your nose prevents _____ from entering your lungs.
 - The digested food is absorbed in the _____
 - _____ carries blood to different parts of the body.
 - _____ controls all the functions of the body.
7. Circle the name of the organ that does not belong to the group.
- Stomach, lung, intestine.
 - Windpipe, lungs, liver, nostrils.
 - Heart, nerves, blood vessels.
8. Match the organs given in Column I with their functions in Column II.

<i>Column I</i>	<i>Column II</i>
i. Heart	a. remove waste from the body
ii. Brain	b. digests food
iii. Bones	c. pumps blood to all the parts of the body
iv. Kidneys	d. give shape to the body
	e. sends messages
	f. controls functions of other organs of the body

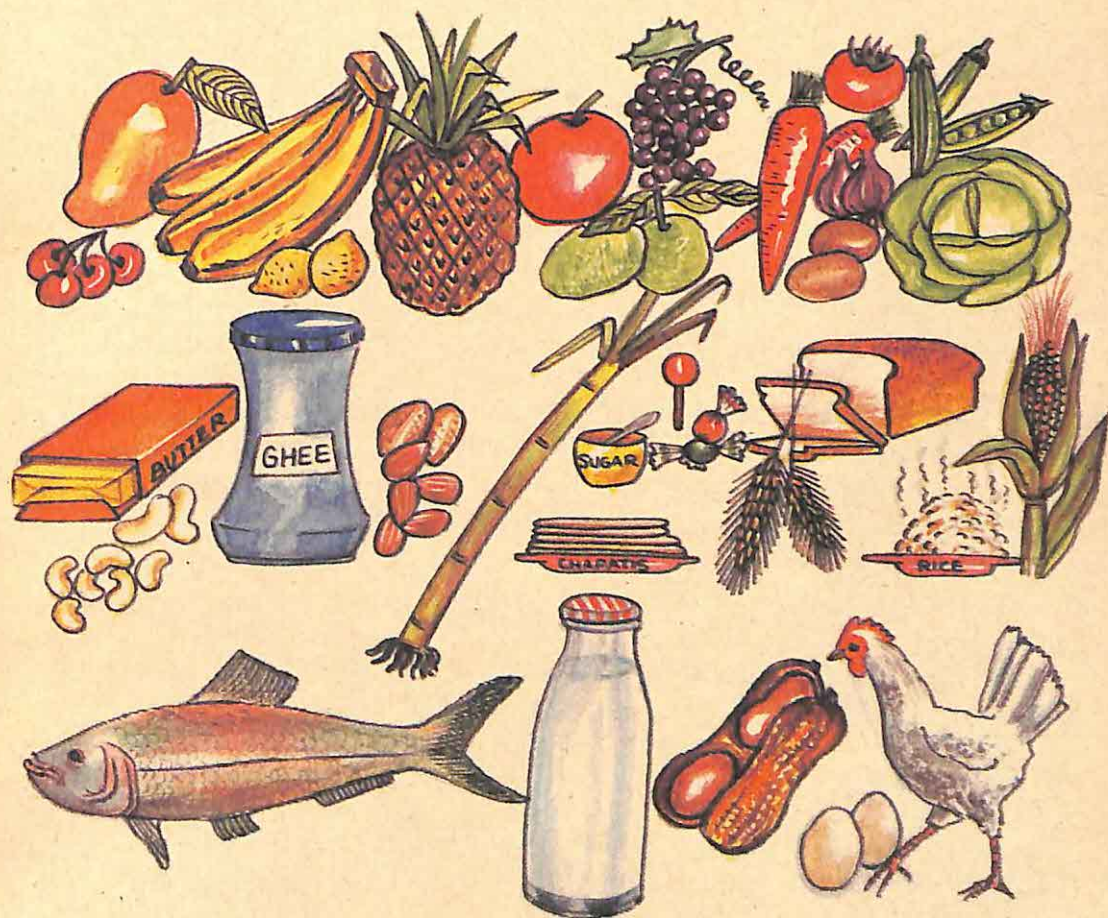
Things To Do

- Count your heartbeat for one minute. Do the following exercises for one minute each. Count the heartbeat after each exercise.
 - Sit and stand two times.
 - Sit and stand four times.
 - Sit and stand ten times.

CHAPTER 5



Food and Food Sanitation



Look at the above picture. Group the food items as in the table on next page. You may also include other food-stuffs not shown in the picture.

S.No.	Food which provides energy	Food which helps in body building and repair	Food which gives protection against disease
-------	----------------------------	--	---

We all need food. Food helps us to grow. It gives us energy to do work. Some foods help to protect us against diseases. All food-stuffs contain substances useful to our body. These are called nutrients. These nutrients are **carbohydrates, proteins, fats, vitamins** and mineral salts.

The energy-giving food contains a large amount of carbohydrates. Carbohydrates are rich sources of energy. Rice, wheat and potato are rich in carbohydrates.

Other energy-rich food such as nuts, ghee and oil, contain fats. Fats also provide energy.

Do This Activity

Make a list of the items that you eat every day. Find out which out of them contain more carbohydrates. Find out which foods are rich in fats and oils.

The more hard work you do, the more energy you need. Study the picture. Which child will need more energy-rich food?

Our body needs food for growth. The food also helps to repair the wear and tear of the body. Which of the nutrients help us in this? Meat, fish, milk, milk products and soyabean are all body building and growth promoting food-stuffs. These food-stuffs contain a large amount of



proteins. Make a list of other food-stuffs rich in protein. Proteins help to build muscles. They also help to maintain and repair the wear and tear of the body. Young children need more protein-rich food than adults. Do you know why?

Green leafy vegetables, yellow vegetables and fruits are rich sources of vitamins and minerals. Vitamins and minerals are necessary to protect us against diseases.

Each one of us needs different nutrients in different quantities. Study the pictures given below.

Who will need more energy-rich food?



Who will need more protein rich food?



Do This Activity

Study the table given below. It shows the daily diet of three families. What is lacking in the diet of the first family? What is lacking in the diet of the second family? Which family consumes food from all the major food groups?

Family No.	Food items eaten in a day
Family 1.	Tea, chapati, rice and arbi , potato curry.
Family 2.	butter, bread, potato curry and chapati, pulses and rice.
Family 3.	sprouted grains, rice, pulses, Chapati, Fish, Green vegetables.

To remain fit and healthy we must eat food from all major food groups. However, our food requirement varies. The food we need also depends on the type of work we do. A diet which contains all the nutrients in the right amount needed for proper functioning of the body is called a balanced diet.

When we eat what we require, we remain healthy. Sometimes we eat more food than is required by us. At times we do not eat the food that is necessary for us. What happens in such cases? The picture given below will help you to understand this.



You can get sick if you eat only energy-rich food or only protein-rich food. You must eat a variety of food from all food groups. Overeating may also make us sick. Eating stale or spoiled food can cause disease.

To take a balanced diet, it is not necessary to eat expensive food. Seasonal fruits such as guava, 'jamun', papaya, berries, 'amla' are rich sources of vitamins. Seasonal vegetables like carrot, radish, turnip, beet, **green leafy vegetables** are rich in vitamins and minerals. You should eat plenty of vegetables and fresh fruits. To increase the nutritive value of food, we use different methods such as sprouting and fermentation. The use of mixed pulses and combination of pulses and cereals also increases the nutritive value of our food. Make a list of dishes which are prepared by combining pulses, cereals and vegetables. Sprouted grains are rich in vitamins. To get more nutrients, you must eat sprouted grains and pulses.

You know that some food items are cooked before eating. Why are some food items eaten only after cooking? What will happen if you eat under-cooked or over-cooked food? Sometimes, nutrients get lost while cooking. How do we know?

Do This Activity

Take any seasonal vegetable. Wash it thoroughly in safe water. Cut it into pieces. Put the pieces in a vessel or a 'Katori'. Add water and boil the vegetable for some time. Take the help of your teacher for this. Cool it. Now taste the water. How does it taste? Is it different from the taste of plain water?

When you boil vegetables in excess water, a lot of vitamins are lost. Do not throw away this water. You must make use of this water. You can use it as soup or for making curry. Do not boil vegetables in too much water. Use just enough water to cook the vegetable till it becomes soft. For boiling rice also, just enough water should be used.

Do This Activity

Visit five families. Find out the methods used by them in cooking rice. Ask them about how they use the rice water. Tell them not to throw away the excess rice water.

The dough used for making 'idli' is allowed to ferment by leaving it overnight. Fermented food is more nutritive. Food such as 'idli', 'dhokla' are cooked in steam. Food cooked by steaming does not lose its nutrients. Make a list of food items cooked by boiling and by steaming. Take the help of your family for this.

There are other methods of cooking. What are these? The names of some dishes and the methods of cooking them are given in the table. Find out how other dishes are cooked.

<i>Dishes</i>	<i>Method of cooking</i>
Puri	Deep frying
Parantha	Shallow frying
Chapati	Roasting
Dosa	Shallow frying
Rice	Boiling/Steaming
Biscuit	Baking
Bengal gram	Roasting

For taste and flavour, we use different methods of cooking. Sometimes, we roast some food items such as Bengal gram, groundnut, maize. Some food items such as cakes and biscuits are prepared by baking.

For good health we must eat simple, wholesome food. Such food is easily digested. The nutrients in food are destroyed by over-cooking and deep frying.

Spices are added to food to make it tastegood. But using too much of spices may be harmful.

What happens when cooked food is kept for a long time?

Do This Activity

Keep some cooked food in a plate in one corner of the classroom. Put enough water to keep the food moist. Observe it over a week. Record your observations in the table as given below:

Day	Changes		
	Smell	Colour	Other changes
1st day			
2nd day			
3rd day			
4th day			
5th day			
6th day			
7th day			

Do you find small, black, green, red or grey dots on the food? Do you also notice a small, fluffy growth on the food? Take a small piece of this fluffy growth. Look at it through a magnifying lens.

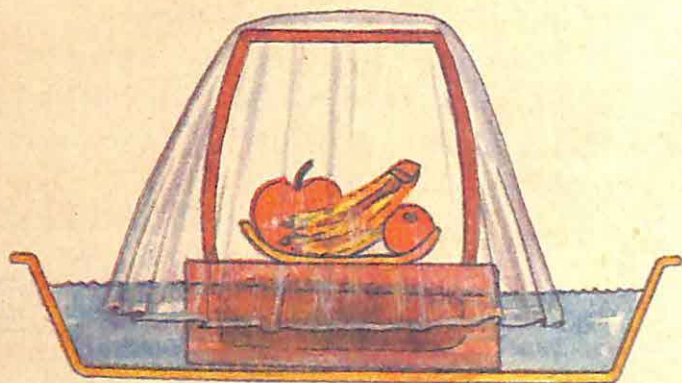
The food gets spoiled when bacteria and mould grow on it. How can we prevent the food from getting spoiled? Let us discuss this.

You have seen a shop-keeper keeping milk in an ice-box. A 'Kulfiwala' keeps his 'Kulfis' in an earthenware pot, covered with a piece of wet cloth. A fish seller keeps fish on ice to keep it fresh. Some food-stuffs such as vegetables and fruits are kept in cold storage. Why is this done? The food kept in a cool place does not get spoiled easily. At home, a refrigerator is used to keep vegetables, fruits and cooked food fresh for a long time.

If you do not have a refrigerator, you can still keep vegetables and fruits fresh for a long time. How can you do this?

Do This Activity

Take a wide-mouthed vessel as shown in the picture. Pour some water in it. Place a brick in the vessel as shown. Put some cooked food or fresh fruit in a plate. Place the plate on the brick. Cover this with an empty earthenware pot. Put a wet cloth over the pot. Let the end of the cloth dip in the water in the vessel. Watch the set-up for some days. What happens to



the food? Record your observations in a table as shown. How long does the food remain fresh?

<i>Days</i>	<i>Changes observed</i>
1st Day	
2nd Day	
3rd Day	
4th Day	
5th Day	

Food kept in a cool place stays fresh for a longer time. In what other ways can we prevent food-stuffs from getting spoiled? Fruits, vegetables, meat, fish can be kept for months together. Often, fruits and vegetables are kept in cold storage to keep them fresh. Vegetables, fruits, meat and fish can also be preserved by drying and salting. What are the other methods of preserving food? Let us find out.

Some fruits and vegetables are preserved by pickling them. The fruit or the vegetable is washed and dried. Then it is cut into pieces and enough salt is added. These pieces are kept in the sun. Oil and spices are then added. The pickle is stored in a dry jar with a tightly covered lid. You should always use a dry spoon to take out pickle from the jar. Pickle gets spoiled if a wet hand or wet spoon is used. Do you know why?

You also enjoy eating jam, jelly, 'chatni', and 'morabba'. These are all different ways of preserving food. In this way seasonal fruits or vegetables can be preserved for future use. We must avoid wastage of food. When there is plenty, we can save it for the future.

Dry food items like pulses, wheat and rice, also get spoiled if they are not stored properly. How do we know?

Do This Activity

Take two containers. Put a handful of green gram, or any other pulse. Mark the containers A and B. Add enough water in container B, to keep the seed wet. Keep container A dry. Cover both the containers with lids. Observe after some days. What changes do you find? Record your observations.

You will find that the food grain exposed to water gets spoiled easily. Therefore, food grains must be stored in dry, air-tight containers. Find out how your mother stores dry food-stuffs at home.

Food-stuffs should also be kept safe from insects and rats. A large amount of food grains are eaten by rats and mice. These also carry disease germs. Therefore, food grains should be stored in proper containers. If possible visit a storehouse. Find out how food grains like wheat, rice and pulses are stored.

Food items exposed to dust and flies may cause diseases. The germs of diseases are carried by flies. Diseases such as diarrhoea, typhoid, cholera



often spread by eating contaminated food. Food should always be covered. Do not eat cut fruits and food exposed to dust and flies. Look at the sick child in the picture. Observe the surroundings. What has caused the sickness.

To prevent these diseases you should take care in handling food. Always wash your hands before handling any food-stuffs. The container should also be kept clean.

Test Yourself

1. Given below are some statements.
Put a tick (✓) mark on the correct statement and a cross (X) mark on the wrong statement in the box provided.
 - i. Over-cooking of food should be avoided.
 - ii. The excess water in which vegetables are cooked should be thrown away.
 - iii. Cooking helps in destroying some harmful bacteria.
 - iv. Over-cooking of food results in protein loss.
 - v. Mixed pulses and vegetables have more nutritive value.
 - vi. Food is cooked to make it more digestible.
2. Fill in the blanks with a suitable word chosen from those given in brackets.
 - i. Milk and soyabean are rich in ————, (carbohydrates proteins).
 - ii. Grains should be stored in ————, place (dry/wet)
 - iii. Sprouted grains should be included in the diet to get more ————, (proteins/vitamins)
 - iv. A combination of different pulses ———— the nutritive value, (increases/ decreases)
 - v. Fermentation of certain foods ———— the nutritive value, (increases/ decreases)
3. Given below are some food items. Put a tick mark (✓) on the food-stuff which has more nutritive value.
 - i. Fried green gram sprouted green gram.
 - ii. Raw carrot/boiled carrot.
4. Given below are pairs of methods for preparing food. Put a tick (✓) mark on the one that helps to preserve the nutrients in the food.
 - i. a. Washing vegetables and then cutting them.
b. Cutting vegetables and then washing them.
 - ii. a. Cooking rice in excess water.
b. Cooking rice in sufficient water.

- iii. Baking ()
 iv. Sprouting ()
 12. Over-cooking of food leads to
 i. Improvement in eyesight ()
 ii. Loss of nutrients ()
 iii. Increase in food value ()
 iv. Increase in appetite ()
 13. Which of the following methods are used in food preservation?
 i. Washing ()
 ii. Salting ()
 iii. Heating ()
 iv. Drying ()
 14. A day's menu for two families is as follows

Family 1Family 2

Roti, butter, milk
 chapati, meat
 rice, dal, curd.

Sprouted gram, milk, guava
 chapati, dal, palak, salad
 rice, dal, beans, curd.

- Which family in your opinion takes a better diet and why?
 13. A farmer had a large harvest of tomatoes. Even after selling them, he is left with a lot of tomatoes. Suggest two methods to preserve the surplus tomatoes.
 i. _____
 ii. _____
 14. Why does food get spoiled faster during the rainy season than during winter?

Things To Do

1. Name six food items which you eat in the raw form as well as in the preserved form. Draw pictures of any three of these.
2. Visit five families in your neighbourhood. Find out about their daily diet. Find out which food groups are lacking in their diet.
3. Plan a weekly meal chart for your family. Include food from all groups.

CHAPTER 6

Safe Water

Water is very important for us. We use water in many ways. Make a list of the different uses of water. Plants and animals also need water. All living things contain a large quantity of water.

Do you know that 70% of our body weight is made up of water? Most of the functions inside our body can be performed only in the presence of water. If we do not drink sufficient water, many functions in our body will not take place.

Every day we lose a lot of water from our body. Some of it comes out as sweat. Water is removed from the body also as urine. Is there any other way we lose water from our body?

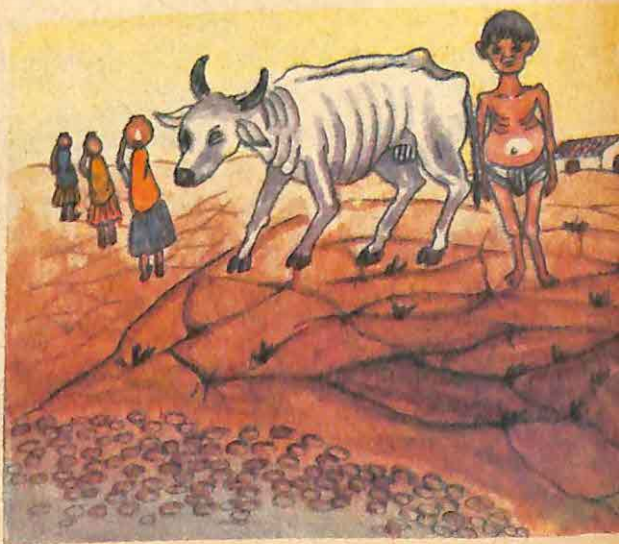
Do This Activity

Take a mirror or even your slate. Breathe out on it. What do you observe? From where did the water on the mirror or slate appear?

The water we lose must be replaced. An adult needs 10-12 glasses of liquids every day. But do we drink so much water every day? We take many other liquids. Find out which are the liquids other than water that we drink.

Living things cannot survive without water. Look at the picture. Observe the surroundings. You will see that the earth is cracked. The plants around have dried up. The animals are sick. There is no water. When the rains fail year after year, there is a drought. Plants and animals, including human beings, suffer a lot without water.

From where do we get our supply of water? Name some important sources of water. When it rains, most of the water goes underground. Some water fills up rivers, streams and ponds. We can get this underground water from wells. We can also get this water by boring deep tube-wells. Find out



major sources of water in your locality. All the sources of water on earth depend on the water cycle. You have learnt about the water cycle in the earlier class. Is the water from all these sources fit for drinking?

You have learnt that water dissolves many substances. That is why it is used for cleaning and washing. The water used for washing and cleaning makes the water dirty. When this dirty water is allowed to flow into the rivers, ponds and lakes, the water gets polluted.



Look at the picture. You find people washing clothes and bathing in the pond. Some are washing animals. Some persons are collecting water from the same pond. What would be the result of drinking such water? Is it healthy to take a bath in such water?

You have already learnt how pond water gets polluted. If you have a well nearby, visit it. Find out what activities go on around the well.

Do people bathe near the well? Do people wash utensils and dirty clothes near it? Do people urinate and defecate near the well? Do they draw out water from the well using a dirty bucket? Where does all this dirty water go? Is there a sloping 'pucca' platform around the well or is the dirty water allowed to stagnate around it? All these things make the well water dirty.

When dirty water is allowed to stagnate, mosquitoes breed in it. Mosquitoes spread malaria. How can we prevent this?

We can prevent the water from getting polluted. The picture given below suggests some ways to prevent water pollution in a pond.



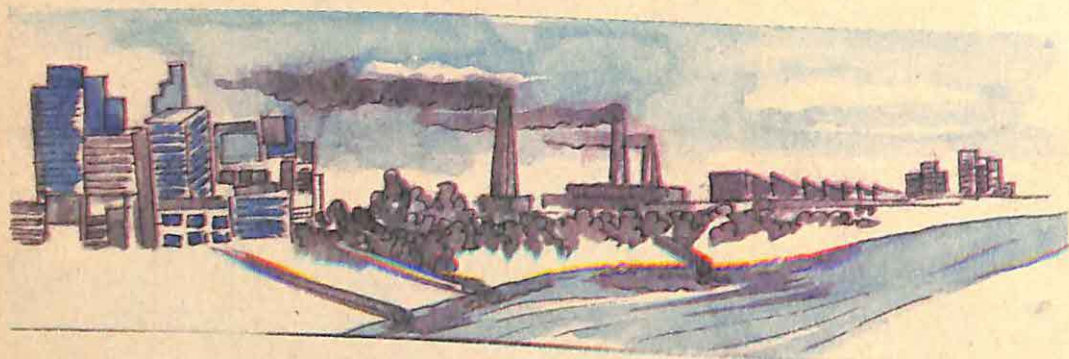
The sources of drinking water should be well protected. We can help to protect the well water. Some of the steps for this are:

- always use a clean bucket or vessel to draw out water from the well. Do not keep the bucket on the ground.
- bathe, wash or clean utensils and other objects away from the well.
- never defecate or urinate anywhere around the well.
- a latrine should not be built near the well. It should be at least 7-8 metres away.



- do not allow waste water to stagnate. Dig a drain (nalla). Allow the water to flow into a soakage pit.
- build a 'pucca' platform around the well. The slope of the platform should be away from the mouth of the well. This will prevent waste water from flowing back to the well.

In big cities, wastes from sewerage, factories also flow into rivers. These materials are harmful to us. Study the picture given on this page. It shows the ways in which the river water gets polluted.



The water, which is polluted is not fit for drinking. How can we make water free from impurities?

Do This Activity

Take two glass tumblers. Mark them A & B. Fill A with tap water or tube-well water. Fill the tumbler B with pond water or stagnant water from a puddle. Keep the tumblers in one corner of the classroom. Do not disturb these. Observe each of the tumblers after sometime. Do you find something settling at the bottom of the tumblers? These substances are some of the impurities in the water. Which tumbler contains more impurities? How can we purify this water?

Pour out the top clear water of tumbler B in another glass tumbler. Take a piece of alum. Put it in the glass tumbler. Keep it for some time. Now observe it again. What do you find?

Slowly tilt the tumbler and pour out the clear water to another container. This process is called decantation. Observe this water. Note its colour and smell. Is this water fit for drinking?

Water which may look clean need not be fit for drinking. It may still have some impurities. It may also have germs. If we drink such water, we are likely to fall ill.

To make water fit for drinking, it should be further purified. How can we purify it?

Do This Activity

Take an earthenware pot with a hole at the base. Put washed and cleaned gravel inside the pot. Cover up to 7 cm. Next, put washed and cleaned sand up to about 7 cm. Place the pot on a vessel as shown. Your filter is ready.

Now pour some dirty water into the pot. Let the water trickle through. Collect it in the vessel. Observe this water. How does it look?

This method is called filtration. Filtration may remove sediments and floating impurities. This water will look clean. But even then it may not be fit to drink.



It may still contain harmful germs which we cannot see. The water which contains germs is called *contaminated water*. Contaminated water spreads many diseases such as cholera, typhoid, diarrhoea, jaundice. Water should be treated with chemicals to make it safe for drinking. Water which is free from germs and impurities is called *safe water*.

The water from ponds, lakes, rivers is not safe for drinking. How can we make it safe?

Do This Activity

Take a glassful of water. Add a teaspoonful of fresh bleaching powder. Do not touch the bleaching powder with bare hands. Add three spoonful of this solution in a bucket full of water. Mix well. The bucket should have about 15 litres of water. Allow the water to stand for some time before using it.

Bleaching powder kills the germs in the water. Another way to kill germs is by boiling. Boiling water for 15-20 minutes kills most germs. In cities, water is supplied through taps. This water is already filtered and treated. During an outbreak of cholera, it is safer to boil even tap water, before use.

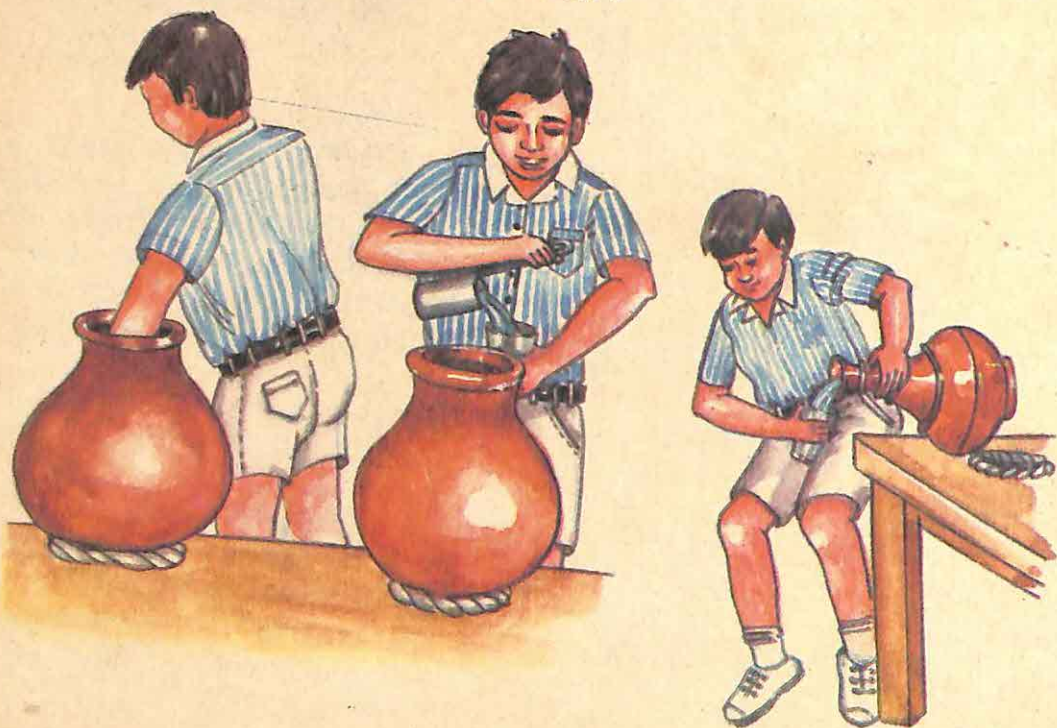
It is not enough to purify water. The water should also be handled and stored in a safe manner. How is this done?

Do This Activity

Take a bottle or any other container with a lid. Fill it with water from a tap or a tube-well. Observe for some days. Does the water look clean? Leave it for some more days or weeks. Observe again. Do you see any change in this water? What does this indicate?

Examine the vessel in which your mother stores drinking water. Ask her how often she cleans it. Does she change the water every day? How does she cover the vessel? How do you take out water from this vessel?

To keep water safe, we must also handle it properly. Water should be stored in clean vessels. We must use clean hands and a clean container to draw out the water. Look at the picture given below. Which is the proper method of taking out water from a vessel?



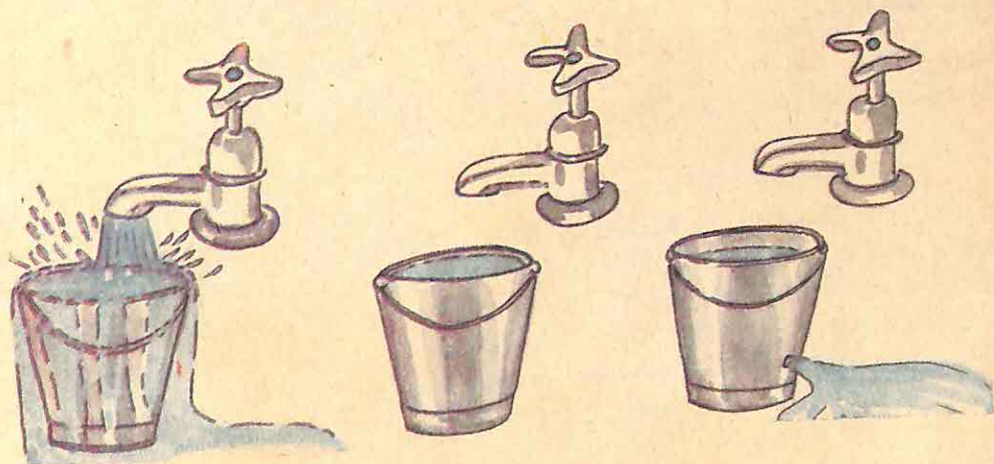
Do all of us practise safe handling of water?

Do This Activity

Visit the place where drinking water is kept in your school. Observe the children drawing out water from the vessel. Do the children dip their hands inside the vessel? Tell them not to do so.

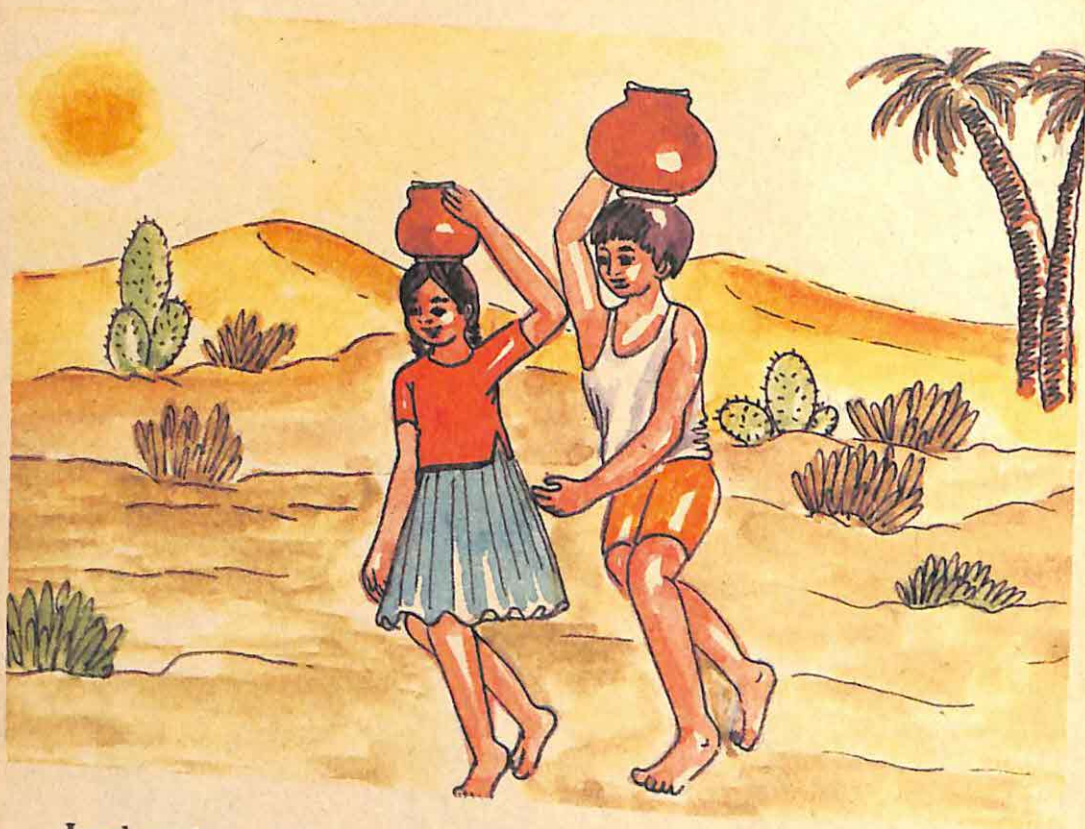
When you dip your dirty hand inside the vessel, the dirt gets into the water. Always use a container with a long handle to take out water from the vessel. Find out which is the proper way to keep this container when it is not in use. You can even pour out the water. You must also wash your hands before handling water.

Take as much water as you need. Do not waste water. Study the pictures given below. Answer the following questions:



In which case is there wastage of water?
 In which case is there no wastage?
 How can this wastage be prevented?

Some of you get tap water in your house. When you need water you do not have to go a long distance to fetch it. Some of you get water from the public tap.



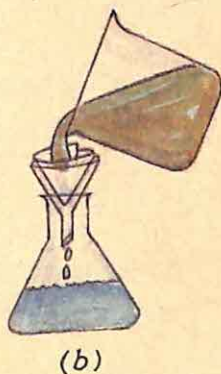
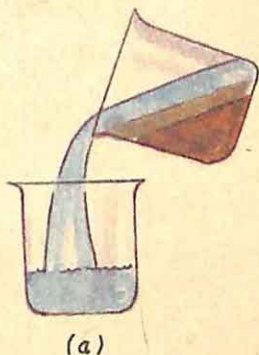
Look at these children. They travel long distances to get water. Most of their time is spent in search of water. When there is not enough rainfall, wells and lakes dry up. There is not enough water. For these children, every drop of water is precious. In the cities where water is supplied through taps, we often waste this precious resource.

We must not waste water. If we do not save water, soon there will not be enough water for all of us.

Test Yourself

1. Complete the following sentences by filling in the suitable words given in the brackets.
 - i. Use of _____ water can cause diseases. (safe, unsafe)
 - ii. _____ and _____ make the water of ponds unfit for drinking (filtering, boiling, washing, cleaning)
 - iii. It is always safe to take out water from a drinking vessel by _____. (dipping your hand, using a long handled container)

2. Study the pictures given below. Which is the better method of purifying drinking water?



3. Given below are some statements, some of which are false and some are true. Put a tick (✓) mark against the true statement and a cross (X) mark against the false statement.
- It is good for health to drink water from a river and pond directly.
 - Bathing animals and cleaning utensils in and around the water source, prevent pollution of water.
 - To make the water free from germs, it should be filtered by using a clean piece of cloth.
 - Water is a natural resource. Therefore, we can waste it.
 - Diseases like typhoid, cholera are caused by evil spirits.
4. List three causes of water pollution. How can you prevent it?
5. If there is a case of cholera in your family, what steps will you take to prevent the spread of the disease?
6. In each of the following, there are four choices. Select the most suitable answer and write its serial no. in the space provided.
- The drinking water in the vessel should be changed after
 - 1 day
 - 2 days
 - 5 days
 - 7 days
 - The vessel in which drinking water is stored should be cleaned
 - daily
 - bi-weekly
 - weekly
 - monthly

- iii. Bleaching powder is used in the water to
- separate dissolved materials
 - kill disease-causing germs
 - make its taste better
 - remove impurities
- iv. Which is the safest source of drinking water?
- river
 - tube-well
 - pond
 - lake
- v. The germs present in water can be killed by
- filtration
 - boiling
 - decantation
 - spraying
- vi. Which, among the following, is caused by drinking unsafe water?
- malaria
 - smallpox
 - diarrhoea
 - measles

Things To Do

- Visit five eating places in your locality. Find out how the drinking water is stored and used. How do they dispose of waste water?
- Visit the source of drinking water in your locality. Discuss whether it is a safe source of water. Suggest ways by which this source can be made safe.
- If possible, visit a community water supply plant with your teacher. Find out how the water is made safe.
- Write two slogans on the importance of water.

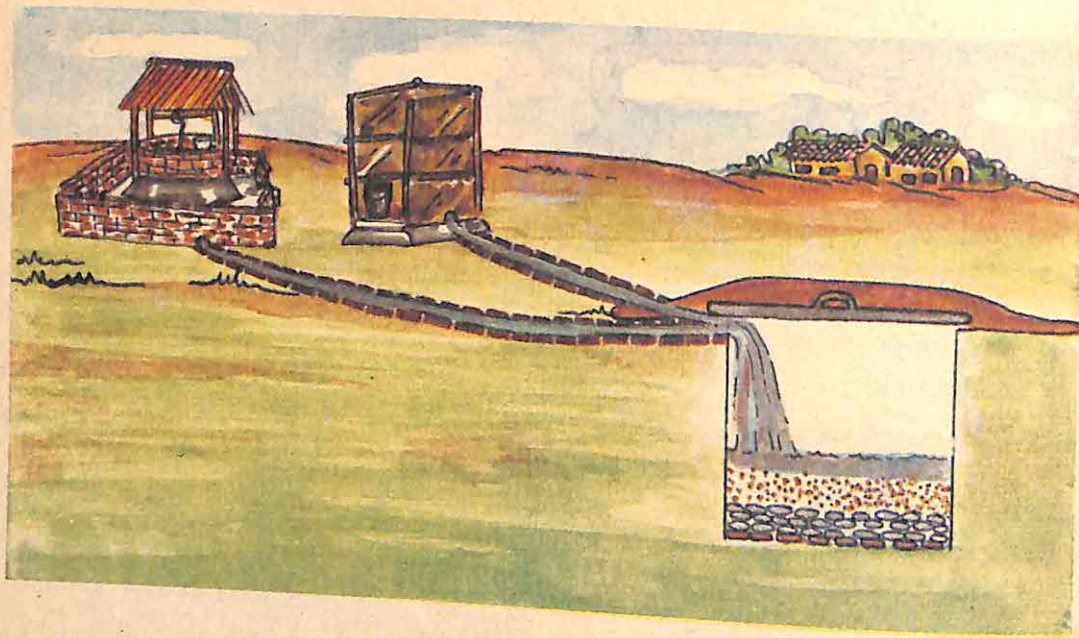
CHAPTER 7

Sanitation and Diseases

Water is useful to us in many ways. The water we use for washing, cleaning and bathing results in waste water. What happens when this waste water is allowed to settle in puddles?



How to dispose of this waste water? The picture below shows one of the ways to dispose of waste water. List other ways.



If you do not have a proper way to dispose of waste water, make a soakage pit. How can you make a soakage pit? It is quite easy to make one.

Select a place where waste water from the household collects. Dig a pit about 60 cm deep. The mouth of the pit should be about 60 cm wide. Dig a drain leading to the pit. Place some pieces of brick and sand at the base of the pit. This will make the base porous. Thus, the water in the pit will soak well. Cover the top of the pit completely with a stone or slab. Cover the slab on the pit with earth so that mosquitoes do not breed. All waste water from the house should be let into this soakage pit. You can help your parents to make a soakage pit. This is one way to dispose of waste water.

What are the other ways to dispose of waste water?

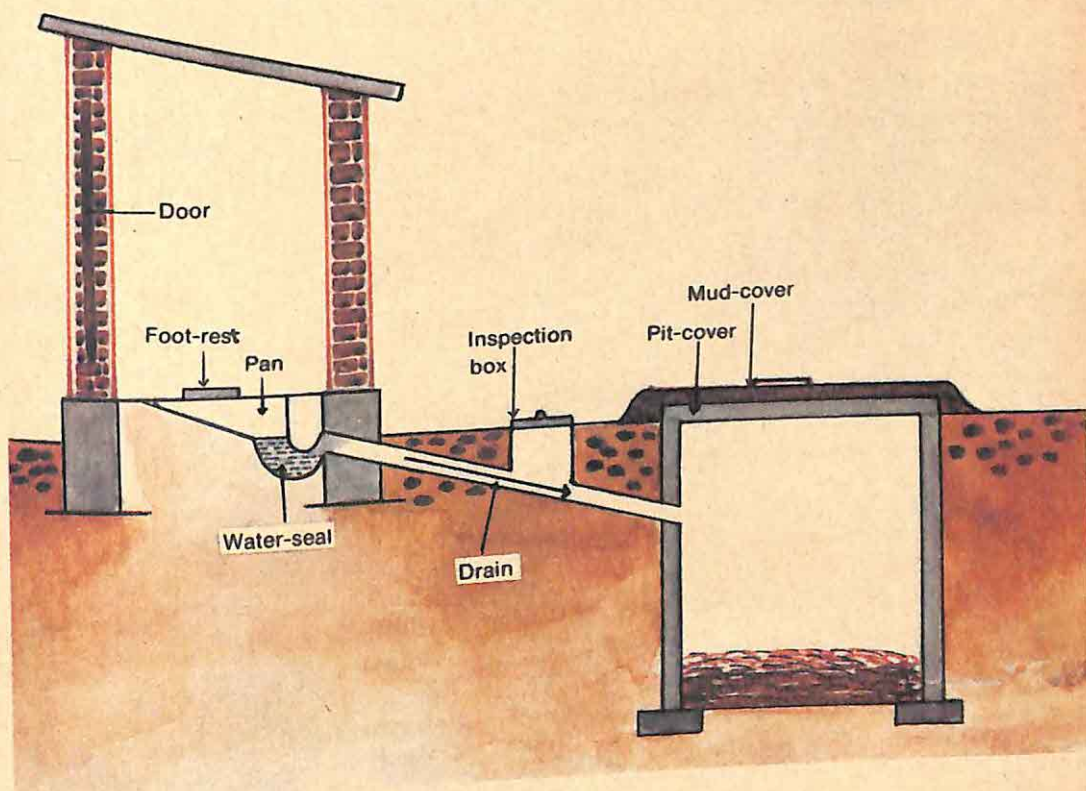
Liquid waste from the bathroom, kitchen and latrine can be collected through a drain. It can then be let into the kitchen garden and used for land irrigation.

What will happen if we allow the waste water to remain in small pools and puddles? Mosquitoes will breed in such water. They spread diseases such as malaria.

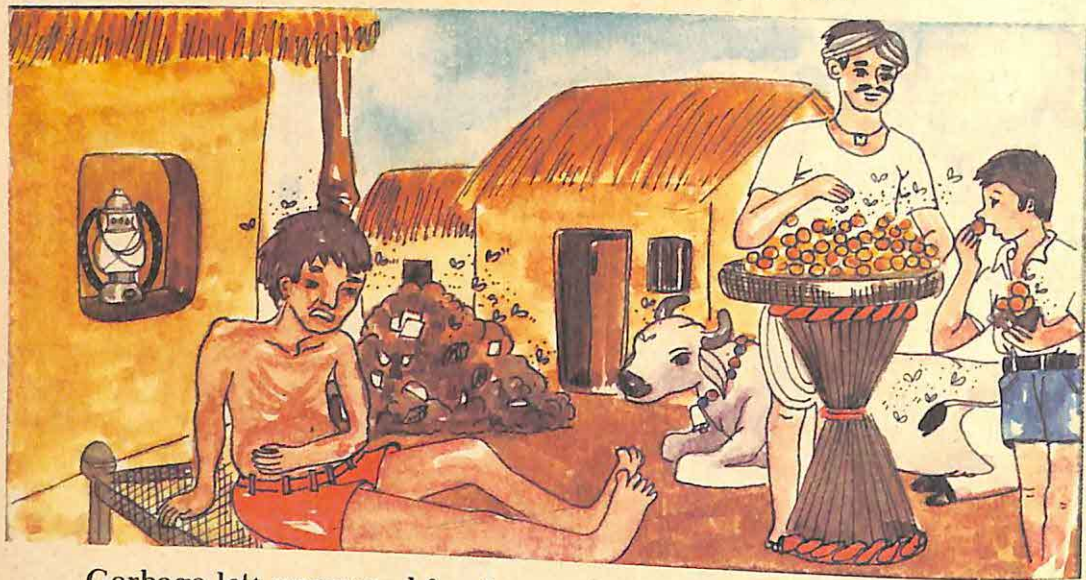
How can we prevent the breeding of mosquitoes? To do so, you can do the following:

- do not allow waste water to stand anywhere. Fill the ground depression with earth
- do not allow water to settle in empty cans, tins and other objects
- keep the drains clean
- cover the water tank; if possible use a netted cover
- change the water frequently in the trough from which animals drink water
- spray a thin film of kerosene over stagnant water at least once a week.
This is more essential in summer months.

In big cities there is a proper waste disposal system. The wastes such as waste water, faecal matter are disposed of through underground sewage. Most houses have sanitary latrines. The picture shows a water sealed flush.



Diseases also spread through contaminated water and eating exposed food. Some of these diseases may also spread through flies. Look at this picture. You see flies all around. In one corner there is an open dump of garbage. There is a sick child. How did the child get sick?



Garbage left uncovered for days starts decaying. Flies breed in it. Flies get exposed to disease germs. You have learnt that flies spread diseases such as diarrhoea, dysentery, typhoid, cholera. The germs of these diseases stick to the body of the flies. When the flies sit on the food, the germs get onto it. Eating such exposed food can make you sick.

Diarrhoea is a very common disease. A child suffering from diarrhoea passes watery stool many times a day. Thus he/she loses a lot of water and salts from the body. If the body does not get back the water and salts, it can be dangerous. Loss of excess water and salt from the body causes dehydration. It can even cause death. But such deaths can be avoided. Fluids and salt given by mouth can prevent dehydration. Such a solution is called *Oral Rehydration Solution*. How can we make this solution?

Do This Activity

Take a clean container, put in it 1 level teaspoon of common salt, 1 level teaspoon of sodium bicarbonate ('Meetha Soda'). Add 8 heaped teaspoons of sugar. Pour 1 litre of boiled and cooled water. Stir the mixture well. The Oral Rehydration Solution is ready. You can add a few drops of lemon juice to make it taste good. Do not store the solution for more than 12 hours.

The solution should be given to the child suffering from diarrhoea. At first, this solution can be given in small quantities after every 5-10 minutes. Later, a cup full can be given after every loose motion. A doctor should be consulted.

We can prevent diarrhoea by keeping the surroundings clean. Garbage should not be allowed to pile up and decay. Some of the steps you can take to prevent the disease are:

- use safe water for drinking and cooking
- keep food and water in clean covered containers
- use a sanitary latrine. If there is no latrine, defecate some distance away from home in pits, and cover the excreta with earth
- always wash your hands after passing stools
- wash your hands before serving and eating food
- keep nails short and clean
- avoid food exposed to dust and flies

We must prevent the breeding of flies. How can we do this? To do so, we must find out which type of wastes help in the breeding of flies.

Do This Activity

Make a list of wastes found in the school, home and road-side. If possible, visit a nearby eating place. You may also observe wastes thrown in the market place. What difference do you find in the various types of waste materials? Where do you find more flies?

You will see that there are different kinds of waste. Vegetable peels, left-over food, decaying animal and vegetable products all attract flies. What are the other wastes which attract flies? Wastes thrown in the open attract flies. Wastes should be collected and disposed of safely. How can you do this? The simplest way is to make a compost pit. You can make a compost pit in your school.

Do This Activity

Select a corner in the school compound. With the help of your teacher, dig a pit. The pit should be 1.5 metre long, 1 metre wide and 1 metre deep. Put the garbage in this pit every day. Cover the garbage with a layer of soil. The garbage will decay after some time. This is called compost. It is an

excellent manure. Most animals and vegetable wastes and animal excreta can be disposed of like this. These wastes are called organic wastes. You have already learnt that we can get biogas from organic wastes such as animal dung and other decaying materials. Find out in what ways these wastes can be turned into useful products.

All waste materials cannot be made into manure. There are other methods of disposal. You will learn more about these methods later.

Some waste materials can be made into useful items. Old newspapers, papers rags and other waste products can be made into pulp. The pulp can be used for making fresh paper. You will learn to make useful and decorative items from waste paper, bits of cloth, bottle caps. Always try to *make use of refuse*. Keep your school, home and neighbourhood clean.

Test Yourself

1. Given below are some statements. Put a tick (✓) mark on the correct statement. Put a cross (X) mark on the false statement.
 - i. Building a soakage pit is best for disposal of garbage.
 - ii. Water left in puddles helps to prevent the breeding of mosquitoes.
 - iii. A child suffering from diarrhoea should not be given water.
 - iv. Clean surroundings help in the prevention of many diseases.
2. Parts (i) to (vii) of this question have four choices. Only one is correct. Put a tick (✓) mark against the correct answer.
 - i. In order to prevent mosquitoes from breeding in stagnant water, it should be sprayed with
 - a. olive oil
 - b. mustard oil
 - c. coconut oil
 - d. kerosene oil
 - ii. Loss of excess water and salts from the body is called
 - a. dehydration
 - b. preservation
 - c. rehydration
 - d. fermentation
 - iii. Oral rehydration solution is made up of
 - a. sugar and sodium bicarbonate
 - b. salt, lemon juice and sodium bicarbonate
 - c. salt, sodium bicarbonate and sugar
 - d. sugar and lemon juice

- iv. Oral rehydration solution should not be stored for more than
 - a. 8 hours
 - b. 12 hours
 - c. 16 hours
 - d. 20 hours
 - v. Animal and plant wastes can be made useful if
 - a. converted into compost
 - b. thrown here and there
 - c. burnt immediately
 - d. all the above
 - vi. Which is the best way to dispose of waste water?
 - a. disposal into an open pit
 - b. disposal into an open drain
 - c. using for the kitchen garden
 - d. using as drinking water for animals
 - vii. Which is the correct way of garbage disposal?
 - a. throwing garbage on the garbage heap in the playground
 - b. throwing garbage into covered, pits
 - c. throwing garbage on the road
 - d. throwing garbage in the corner of the courtyard of the house
3. Observe carefully the pictures given below. People in House 1 are unhealthy, whereas people in House 2 are healthy. Give one reason for this.



House 1

House 2

4. i. What precautions would you take to prevent diarrhoea? List any six precautions.
- ii. List the steps to prepare oral rehydration solution.

5. Given below are pictures of two shops. From which shop should one buy things to eat? Why?



6. Gita ate cut fruits which had been exposed to dust and flies. Soon, she fell sick. Which of the following diseases is she likely to get? Rabies, Itching, Cholera, Tuberculosis, Chicken-pox, Ringworm.

Things To Do

1. Visit your neighbourhood. Find out which activities make the surroundings unhygienic. Suggest some measures you would take to keep your surroundings clean.
2. Find out which kinds of waste are generated in your home, How are they disposed of?
3. Make some useful and decorative items from used materials such as card boxes, cards, empty tins and bottles.

CHAPTER 8

Materials and Their Properties

You already have some idea about materials. We see a variety of materials around us.

Make a list of materials which you use at home and in school. Your list might contain a variety of materials. Some of these may be solids such as paper, cotton, cloth, metals. You may have also listed some materials which are commonly found as liquids. Does your list also contain some materials which are gases? Write these down in a table as shown.

[illegible]

How can you recognize materials?

You can recognize them in different ways—by touch, by their colour, by their smell. These are some of the features that help you to recognize a material. Such features are called the properties of materials. In this chapter you will learn about some properties of materials.

Do This Activity

Take a rubber cork, a piece of sponge, a ball of cotton, a piece of stone, a piece of wood and an iron rod. Also take some potter's clay or plasticine. Press each of them with your hand. Which of them are hard? Which of them are soft?



Rubber Cork



Sponge



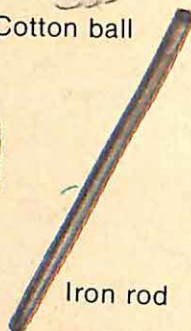
Cotton ball



Stone



Wood



Iron rod



Potter's clay



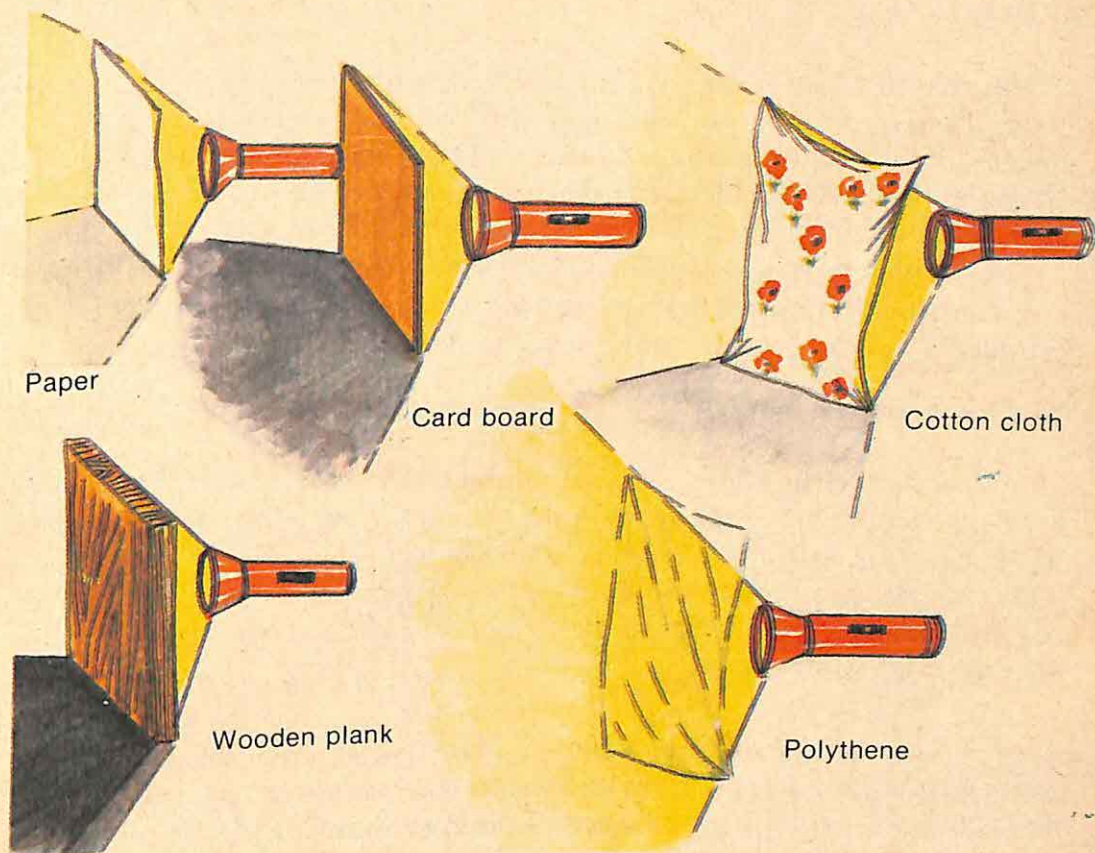
Some materials are hard. Some are soft. Some keep their shape when pressed. Some do not. In what other ways do materials differ from each other? Let us find out some other properties of materials.

Do This Activity

Take a sheet of paper, cardboard, cotton cloth, a wooden plank and a sheet of polythene. Hold each of these in front of your eyes and look through them. Are you able to see through each of them? Now direct a torchlight on each of them

Which of these materials allow the light to pass through? Which of them do not allow light to pass?

Materials which allow light to pass through them, are called *transparent*. Those which do not allow light to pass through are called *opaque*. How is this property of materials used in our daily lives? Let us learn about some more properties of materials.



Do This Activity

Take a wooden rod and an iron rod. Put one end of the wooden rod in fire. Hold the other end of the rod. Does the rod feel hot? Now keep one end of the iron rod in the fire. Hold the other end of the rod. What do you feel? Can you continue to hold the iron rod? Why not?

Some materials allow heat to pass through. Others do not. Why do we use a wooden or plastic handle in a saucepan? Find out some other examples where this property of materials is useful. What are some other properties of materials?

Do This Activity

Take a piece of wood, a few marbles and an iron rod. Strike each of them with a hammer. What do you observe? Which of the materials break easily? You have already learnt that many solids dissolve in water. Make a list of the solids that dissolve in water.

Do This Activity

Take four glass tumblers. Fill them half with water. Take some sand, chalk powder, common salt and sugar. Put sand in one glass tumbler, chalk powder in the second, common salt in the third and sugar in the fourth. Stir the contents of each tumbler. Observe the contents of each tumbler after some time. What do you notice? Which materials dissolve in water?

Some materials dissolve in water. Some do not dissolve in water.

You are now familiar with some properties of a few solid materials. Can you identify some properties of a few common liquids and gases?

Do This Activity

Take some clean water in a glass tumbler. Observe its colour. Does water have any colour? Smell the water in the tumbler. Does it have any smell? Put some water on burning firewood. What do you notice?

Also take also samples of liquids other than water such as milk, mustard oil, coconut oil, kerosene. Observe the colour and smell of each liquid. What difference do you notice?

Liquids can be distinguished by their colour and smell. Water is colourless. It has no smell. Kerosene also colourless but it has a smell. What are the properties of water and kerosene? Kerosene can burn. Water is used to put out fire. What are the other uses of kerosene?

Like solids and liquids, gases also have different properties. Some gases can burn. Some do not burn. Some have a strong smell. Some do not have a smell. Man uses these properties of materials in different ways. List some of these uses.

Materials differ from each other in many ways. What are all materials made of? Let us find an answer to this question.

Do This Activity

Take a piece of chalk, some marbles, sugar candy and salt crystals. Also take a bit of limestone. Crush each of these into fine powder. Look at the powder through a hand lens. What do you see?

Chalk, salt, sugar and limestone are made up of small particles. Like these, all solids are made up of tiny particles. Are liquids also made up of tiny particles?

Do This Activity

Take some water in a dish. Keep it out in the sun. Observe it after some time. Where did the water disappear?

You know that water evaporates all the time. When it evaporates, water changes into water-vapour. Water-vapour is made of very, very small particles. You cannot see them. Like water, all other liquids are also made up of particles. Are gases also made up of particles?

All materials are made up of particles. Do you know that Rishi Kanad of ancient India knew that all materials consist of tiny particles?

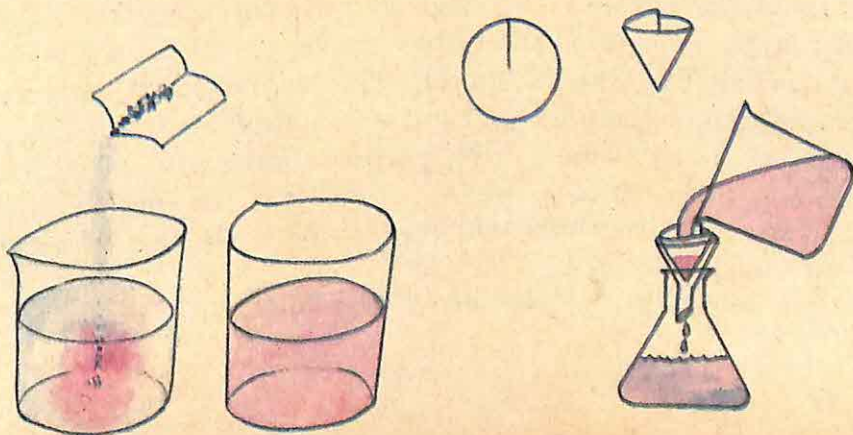
Do This Activity

Take a glass tumbler. Fill it with water. Take a few crystals of potassium permanganate. Put them into the water in the glass tumbler. Do not disturb the water. Observe what happens. Note down the changes that take place in the water. Can you see the potassium permanganate crystals now? Is the colour of the solution the same throughout? Look at the solution after a few hours.

The crystals of potassium permanganate break up into smaller particles. Once it dissolves, you can no longer see the crystals of potassium permanganate. The colour of the solution becomes uniform. This indicates that the particles of potassium permanganate are uniformly distributed throughout the solution. Let us know something more about solutions.

Do This Activity

Take the potassium permanganate solution you have prepared. Now fold a filter paper as shown in the picture. Put it inside a funnel.



Wet the paper with clean water. Place the funnel over a glass jar. Carefully pour some potassium permanganate solution on to the filter paper in the funnel. Be sure that no solution gets through the funnel without going through the filter paper.

Examine the filtered liquid in the glass jar. Is it still coloured? Did any coloured material stay on the filter paper? Hold the jar up to the light. Is the solution in the jar clear?

Can we get back the dissolved substance from a solution?

Do This Activity

Take a small bowl. Fill it half with water. Dissolve two teaspoonsful of common salt in it. Stir the water till the salt dissolves. Is the solution clear? If not, filter the solution to remove any solid particles.

Transfer the solution to another bowl. Heat the salt solution slowly till all the water evaporates. What is left behind in the bowl?

Is there any other way of getting back the dissolved material?

Do This Activity

Take some salt solution in a bowl. Keep it in the open, undisturbed. The water will evaporate slowly. Observe it every day till all the water has evaporated. What is left in the bowl? How is it different from what was left when the solution was heated?

In both cases, crystals of common salt are left behind. We get bigger crystals when the water is evaporated slowly. Common salt has large crystals.

You know that sea water has large quantities of common salt dissolved in it. How do we get common salt from sea water? The sea water is kept in shallow trenches. The water evaporates slowly. When all the water in the trench has evaporated, crystals of common salt are left behind.

Are all solutions made by dissolving a solid in a liquid?

Some solutions contain one liquid dissolved in another liquid. For instance, water and alcohol are both liquids. When they are mixed they also form a solution.

Are there solutions which contain a gas dissolved in a liquid?

Do These Activities

- i. Take a glass bowl. Fill it half with water. Heat the water. Observe the sides and bottom of the bowl. Do you notice any air bubbles? Where do they come from?
- ii. Take a bottle of soda. Open the bottle. What do you observe? Do you notice bubbles of a gas rising to the surface of the liquid? Where do they come from?

When you heat water in a bowl, you notice small bubbles forming on the sides and bottom of the bowl. These are bubbles of the air that was dissolved in the water. You know that fish breathe the air that is dissolved in the water.

When you open a bottle of soda, you see bubbles of a gas rising to the top of the liquid. This gas is called carbon dioxide. The dissolved carbon dioxide gas gives the drink a stinging taste.

Are solutions made only by dissolving a substance in water? Can solutions be prepared by dissolving the substance in any other liquid?

Do This Activity

Take a small piece of candle wax. Put it in a glass tumbler containing water. Observe the candle wax carefully for some time. Does it dissolve in water?

Take a glass tumbler. Put into it some kerosene. Put a small piece of candle wax in it. Observe the candle wax. Does it dissolve in kerosene?

Water dissolves more materials than any other liquid. But there are also some materials that water does not dissolve. You have seen that candle wax does not dissolve in water. But it dissolves in kerosene. If you have paint sticking on your hand, you cannot wash it off with water. Why? If you use kerosene or petrol, the paint comes off quickly.

Many materials like sugar, common salt and potassium permanganate dissolve easily in water. Therefore, we say sugar and common salt are soluble in water. Paint does not dissolve in water. Therefore, we say that paint is insoluble in water. But paint is soluble in kerosene or petrol.

A liquid that can dissolve materials is called a solvent. Water is the most common solvent. To dissolve materials that are insoluble in water, we use other solvents such as alcohol, kerosene or petrol.

You have learnt some properties of materials. Each material can be identified by some tests. You will learn about these tests in higher classes. You will also learn more about properties of materials later on.

Test Yourself

1. Given below are some statements. Put a tick (✓) mark against the true statement and a cross (X) mark against the false statement.
 - i. Kerosene is a gas.
 - ii. Water is a colourless liquid.
 - iii. Wood is a good conductor of heat.
 - iv. Glass breaks easily.
 - v. Salt dissolves in water.
2. Fill in the blanks with the most suitable word. Choose from the words given in the brackets.
 - i. Rubber is a _____ conductor of heat. (good, bad)
 - ii. Kerosene is a _____ liquid. (colourless, coloured)
 - iii. Sand is _____ in water. (soluble, insoluble)
 - iv. _____ allows light to pass through it. (wood, glass)
 - v. Carbon dioxide is a _____. (liquid, gas)
3. Questions (i) to (iv) below have four alternatives. Only one of them is correct. Put a tick (✓) mark against the correct answer.
 - i. Candle wax dissolves in
 - a. water
 - b. kerosene
 - c. mustard oil
 - d. none of the above
 - ii. Paint is soluble in
 - a. water
 - b. mustard oil
 - c. kerosene
 - d. coconut oil
 - iii. Common salt is obtained from sea water by
 - a. evaporation
 - b. decantation
 - c. filtration
 - d. sedimentation
 - iv. Air bubbles in a soda bottle are due to a gas called
 - a. oxygen
 - b. nitrogen
 - c. hydrogen
 - d. carbon dioxide
4. Name two materials which do not allow light to pass through them completely.

5. State two properties of water and kerosene.
6. Given below are some materials. Find out which are soft and which are hard.
 - i. plastic
 - ii. wood
 - iii. rubber
 - iv. glass
 - v. cardboard
7. Group the following materials into transparent and opaque.
 - i. glass
 - ii. mirror
 - iii. iron-sheet
 - iv. brick
 - v. wood
8. Match the following

i. water	a. helps in burning
ii. kerosene	b. dissolves in water
iii. sugar	c. is colourless
iv. stone	d. is insoluble in water
v. ice	e. is a gas
vi. rubber	f. is a solid form of water
vii. glass	g. conducts heat
viii. metal	h. bends easily
	i. breaks easily
9. Design an experiment to show that things dissolve more easily in hot water than in cold water.

Things To Do

1. You are given a mixture of sand and salt in water. How will you separate them?
2. Find out how crystals of sugar ('mishri') are obtained from a sugar solution.

CHAPTER 9

Weather and Its Influence on Life

You have learnt about different kinds of weather. Many of our activities are affected by changes in weather. You have also learnt that the sun plays an important role in the changes in weather.

You have also learnt about seasons. In summer it is hot, in winter it is cold. There are more hours of sunshine in summer than in winter. The days are longer in summer than in winter. Have you experienced that there is more warmth in summer than in winter?

The sun warms the earth during the day. The sun is also more directly overhead in summer than in winter.

Why is the sun warmer when it is directly overhead?



Do This Activity

Take a piece of cardboard. Draw a square of 10 cms length and 10 cms breadth. Cut this out to make a square hole. Take the cardboard out into the playground in the early morning. Hold the cardboard 20 centimetres away from the ground as shown in the picture on page 79. A patch of light falls in the centre of the shadow. Trace the outline of the lighted patch.

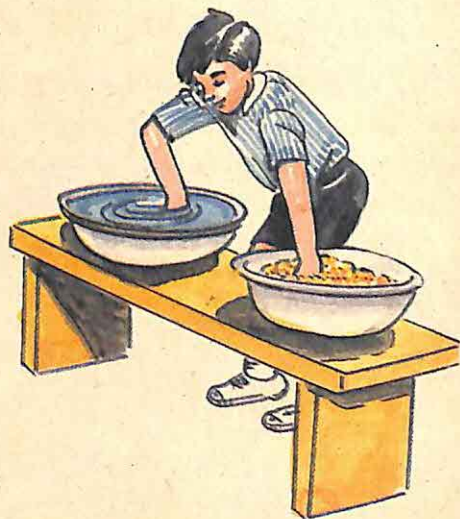


Do this again at mid-day. Hold the card board as shown. Again trace the outline of the lighted patch in the shadow of the cardboard. Compare the two outlines. What do you find? The same amount of light came through the hole in the morning and at mid-day. But the area in which it falls is different.

The sun warms both land and water. During day-time, which becomes warm more quickly? Land or water?

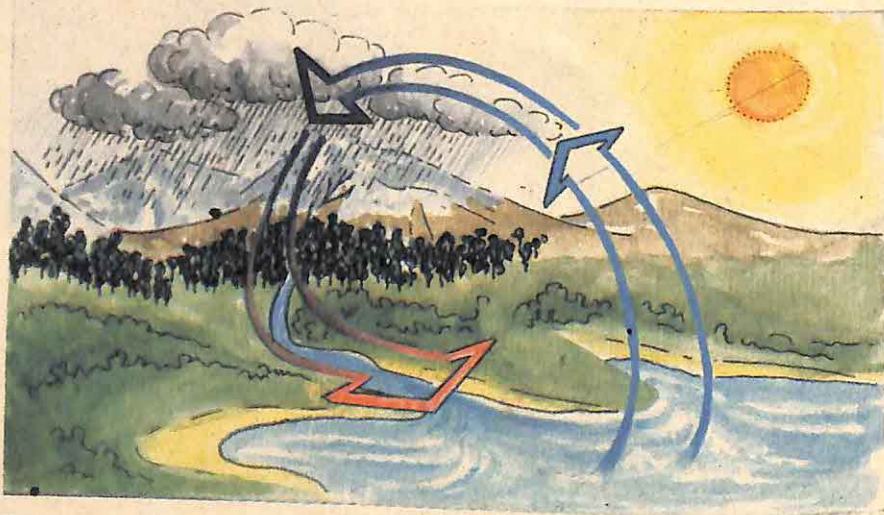
Do This Activity

Take two similar wide-mouthed pots. Fill one with sand and the other with water. Touch the sand and water in the pots. If you have thermometer find out the temperature in the pots. Keep both the pots in sunshine for about two hours. Again feel the sand and water in the pots. Which is hotter?



Now place the two pots inside a room. Keep them there for an hour. Again feel the sand and water in the two pots. Which is hotter? If you have a thermometer find out the temperature in each pot. Which warmed up more quickly? Which cooled more quickly? The same thing happens in nature. The land becomes warm more quickly than water. It also gets cooled more quickly. Have you noticed that at night, land cools faster than water. For the same reason, the nights are much cooler than days in the desert areas.

The sun plays an important role in causing rains. After the rains, what happens to the rain water? Where does the rain-water go?

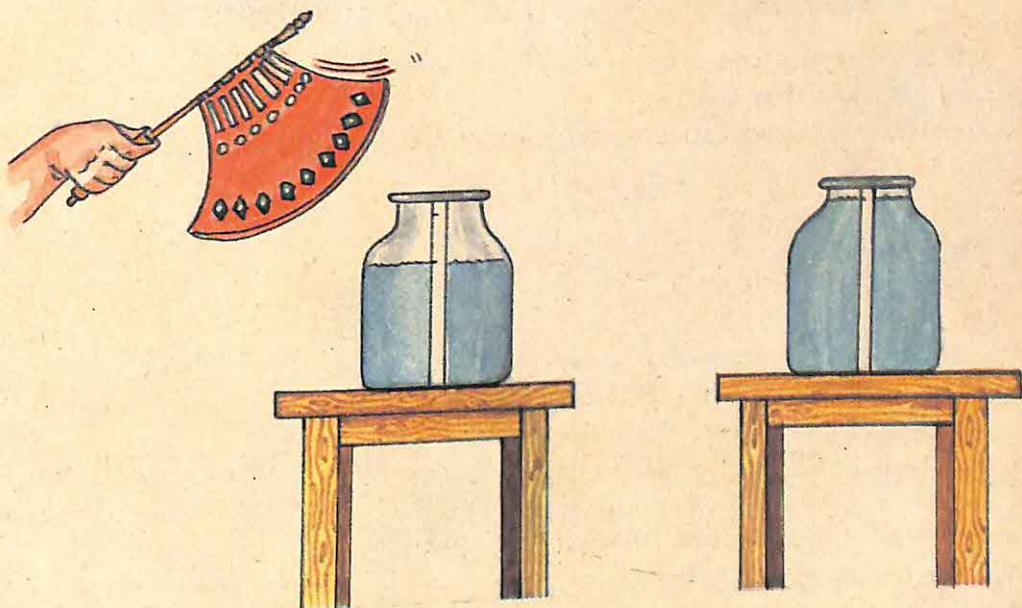


The water changes into water-vapour. The change of water into water vapour is called evaporation.

In nature, evaporation of water takes place all the time. Sometimes it is fast. Sometimes it is slow. What conditions favour evaporation? Evaporation is faster when the weather is windy.

Do This Activity

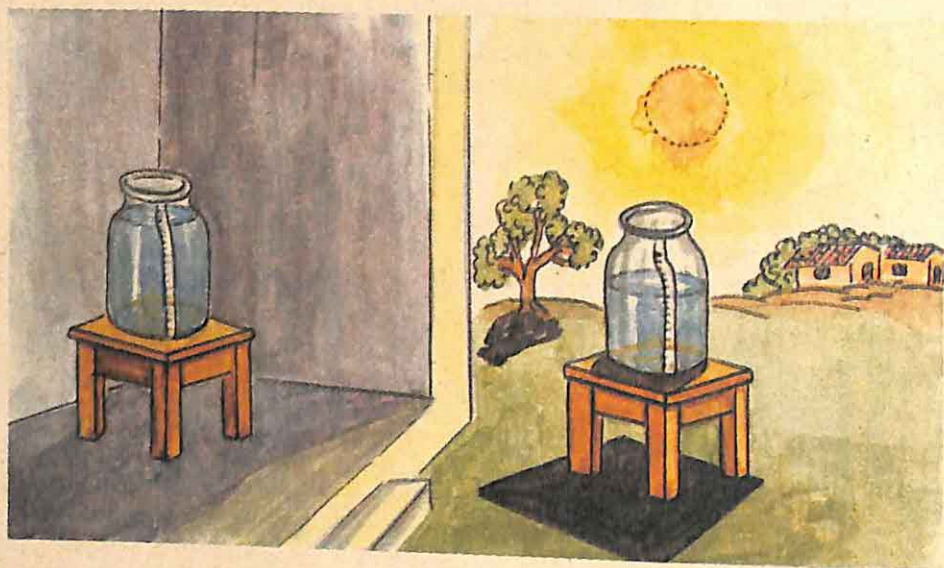
Take two similar wide-mouthed bottles. Fill them with water. Paste a strip of paper on each bottle. Keep the water level the same in both the bottles. Keep aside one bottle undisturbed. Keep the other bottle below a hand fan. Take turns to fan the bottle. Continue fanning for about half an hour. Mark the water levels again in both the bottles. What difference do you find in the two cases? Have you noticed that wet clothes dry quickly in windy weather?



Have you experienced that evaporation is faster on warmer days than on colder days?

Do This Activity

Take two similar bottles. Fill them with water up to the same level. Mark the water level in both the bottles. Keep one in the sun and the other in the shade. Observe the water levels after about four hours. Is there any difference in the levels? From which bottle did water evaporate faster?



Have you noticed that when wet clothes are spread out, they dry quicker? Why is this so?

Water evaporates faster when the exposed surface is large.

Do This Activity

Take two utensils: one tumbler and one '*Thali*'. Fill up the tumbler with water. Pour the water into the '*Thali*'. Again fill the tumbler with water. Keep these two utensils undisturbed for two or three days. Observe them every morning and evening.



After a day or two you might find that enough water has evaporated. Mark the level of the water in the tumbler. Throw away the water of the tumbler and transfer the water from the '*Thali*' into the tumbler. What difference do you observe? Which container has more water left, the tumbler or the '*Thali*'?

Relate in with spreading out of clothes for drying. Have you noticed that on a dry day, clothes dry quickly? On a rainy day, clothes takes longer to dry. This is because on a rainy day there is a lot of water-vapour in the air. We say there is more humidity in the atmosphere. This slows down evaporation.

If water-vapor is cooled, we get back water. The change of watervapour into water is called condensation. The change of steam into water is also condensation.

Do This Activity

Take a kettle. Put some water into it. Boil the water. Put a plate over the steam. See what happens. The steam condenses into water. Cooling changes water-vapour into droplets of water.

The water-vapour in the air is a part of the water cycle. The water from the land evaporates. It goes up into the air. There it cools. Cooling changes the water-vapour into droplets of water. There it forms clouds. When the droplets of water are too large to stay in the clouds, rain is formed. Rains are useful for crops. But heavy rains, especially during the harvest season, damage standing crops.



During day everything absorbs heat. At night this heat is given out. Grass, flowers and leaves of plants give out heat more quickly than other things. Thus they become very cold. When moist air touches them it also becomes cold. It cannot then hold the water-vapour in it. This water vapour condenses on grass and leaves in the form of shining droplets. This is called *dew*. Have you noticed that when you walk on grass early morning in winter, your feet and shoes get wet? This is due to dew formed on grass.

Dew is not formed on cloudy nights and in shady places. It is also not formed on windy nights. Find out why it is so.

In extreme winter the earth becomes very cold. Its surface becomes colder than ice. The dew drops freeze and become *frost*. The frost causes great damage to crops.

Have you seen a smoke-like thing very near the ground in a winter morning? In this situation one is not able to see properly even nearby things. The visibility is poor. This is due to fog. How is the fog formed?

You know that the particles of dust float in the air. When moist air comes into contact with cold air it gets cooled. Some of the water vapour in the air condenses on these particles and forms fog. As soon as the sun shines, the water evaporates, the fog disappears.

When rain drops are falling towards the earth and the wind is blowing at a great speed, it carries the rain drops upward into colder regions. They freeze and become *hail*. They fall on the earth as *hail stones*. Hail stones are harmful for crops and animals.

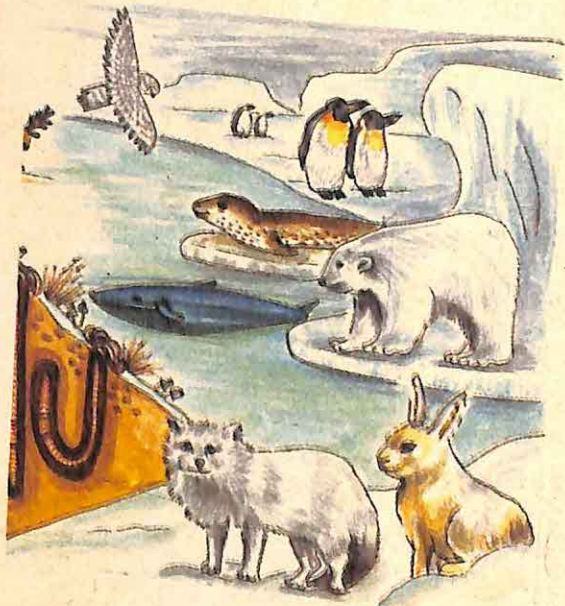
When the clouds move up because of strong winds to very very cold regions of the atmosphere, the water-vapour freezes. They then fall as *snow*. Snow is light. It looks like pieces of cotton and wool. It falls on high mountains in winter and in very cold climates. Hardened snow forms *ice*.

Thus remember that

- * Dew and Frost are formed *on* the surface of the earth.
- * Fog is formed *near* the surface of the earth.
- * Cloud, rain and snow are formed at a considerable height *above* the surface of the earth.

Weather affects all of us. Each day, the weather is important for us. In cold weather we have to protect ourselves against cold. We wish to keep our houses warm. What methods are used for keeping the house warm? In hot weather we wish to protect ourselves against heat. What methods are used to prevent the house from getting hot.

Changes in weather also affect the lives of animals and plants. How? Discuss this with your classmates, teacher and parents.



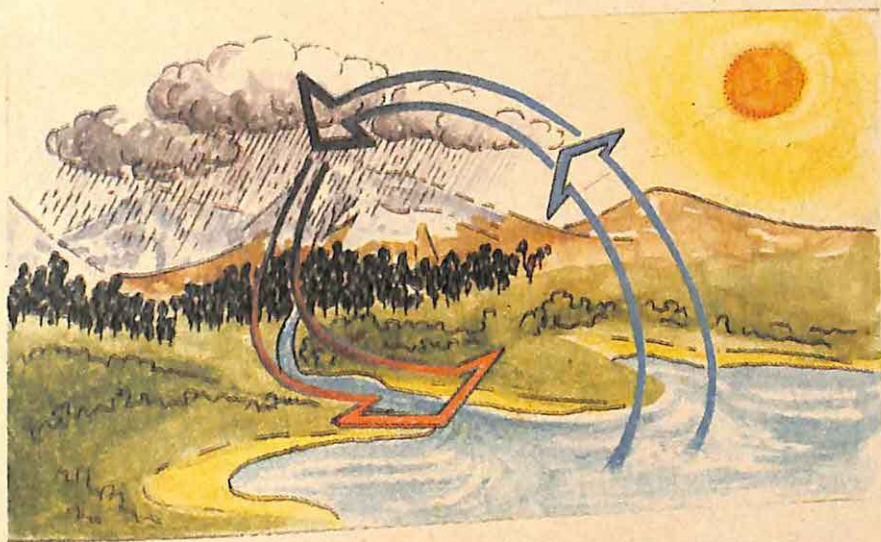
Test Yourself

1. Questions (i) to (iii) have four alternatives. Only one of them is correct. Put a tick (✓) mark against the correct answer.
 - i. In causing the water cycle
 - (a) only evaporation is involved.
 - (b) only condensation is involved.
 - (c) condensation and evaporation are both involved.
 - (d) neither is involved.
 - ii. Hail stones are the
 - (a) solid state of water.
 - (b) liquid state of water.
 - (c) gaseous state of water.
 - (d) none of the above.
 - iii. When water-vapour freezes in the air it forms minute ice crystals and falls in the form of
 - (a) snow
 - (b) hail
 - (c) sleet
 - (d) rain
2. Given below are some statements. Put a tick (✓) mark against the true statement. Put a cross (X) mark against the false statement.
 - i. The sun is not the main source of light and heat on the earth.
 - ii. Condensation and evaporation are the same processes.
 - iii. Water evaporates faster when it is not windy.
 - iv. Water evaporates faster when the exposed area is large.
 - v. When the air is dry, water evaporates faster.
 - vi. The temperature of the environment does not affect the process of evaporation.
 - vii. Evaporation takes place all the time.
3. Fill in the blanks in each sentence given below with a suitable word.
 - i. Water _____ and changes to water-vapour (evaporates, cools)
 - ii. Water vapour _____ and changes to water (evaporates, cools)
 - iii. It is warmer when the sun's rays are _____ than when they are _____ (overhead, slanting)
 - iv. The _____ plays an important role in causing changes in weather.

- v. The process of changing water into water-vapour is called _____ (sun, moon, earth)
- vi. The process of changing water-vapour into water is called _____ (condensation, evaporation)
- vii. During the day the _____ (condensation, evaporation) gets warm more quickly than _____
- viii. Hail stones are _____ (land, water) state of water. (liquid, solid)
4. Fill in the blanks:
- Heavy rain damages. _____
 - Water-vapour in the atmosphere may condense into _____
 - The sun gives _____ and _____ to plants and animals.
 - When water vapour condenses on cold objects _____ is formed.
 - When water-vapour freezes in the air, it forms minute ice crystals and falls in the form of _____
- 5.
- Write five sentences describing rainy weather.
 - Write five sentences describing cold weather.
 - Write five sentences describing sunny weather.
 - Write five sentences describing the weather of your choice.
 - Write two differences between fog and dew.
 - List the steps involved in the water cycle.
6. The timings of sunrise and sunset are given below for different seasons. Write the name of the season.

Sunrise	Sunset	Name of the season
5 a.m.	7 p.m.	_____
7 a.m.	5 p.m.	_____

7. Which arrow indicates evaporation and which arrow indicates condensation in the figure given below?



Things To Do

1. Set up and describe an experiment to study the rate at which water evaporates from a glass jar or any cylindrical glass vessel.
2. Write ten sentences on "The sun plays an important role in causing changes in weather."

CHAPTER 10

Soils and Crops

Soil is needed for crops, building houses, making utensils, toys, and so on. Plants grow and depend on soil. Animals depend on plants. We depend on both plants and animals. Therefore, without soil, life on earth would not be possible. What are the different kinds of soils?

Do This Activity

Collect soil from different places such as the road-side, garden and playground. Note the colour of the soils. Examine the soil particles. Some particles are big. Some are small. Collect some pure sand from a building site or a river bed. Also collect some pure clay from a potter or from a field. Mix these soils. Crush the mixture. Spread it on a white paper. Examine it. Do you see some big particles and some small particles? Now look at it through a hand lens.



The bigger particles are of sand. The smaller particles are of clay. Besides sand and clay, are there other things in the soil?

Do This Activity

Collect some garden soil. Put the soil into a glass tumbler containing water. Stir the contents. Allow the soil to settle for about five minutes. Observe closely how the soil settles. What do you see? Big particles settle faster. Small particles settle slowly. Do you also see some floating material

on the water surface? This floating material is called *humus*. Humus makes the soil fertile. A mixture of sand, clay and humus is called *loam soil*. What does humus contain? Examine the floating material carefully with a hand lens. You can see the decaying bits of leaves, insects and other things floating on the water surface. These are the things which humus contains. Which type of soil contains more humus?



Do This Activity

Collect some sandy soil, clayey soil and loamy soil. Repeat the above activity with each of the soils. You will see that the loamy soil contains more humus. Pure sandy soil does not contain humus. Pure clayey soil contains less humus. Which of the above soils is good for crops? Is there any relationship between the humus content of soil and plant growth?



Do This Activity

Take pure sand, pure clay and loamy soil. Take three pots. Fill up the pots. Each pot should contain only one kind of soil. Put Bengal gram seeds in all the three pots. Place the pots in the sun. Water the pots regularly.



Sand



Clay



Loam

Observe the growth over a few weeks. In which pot does the plant grow well? Record your observations in the table as given below.

Pot containing	Growth (in weeks)			
	I	II	III	IV
Sandy soil				
Clayey soil				
Loamy soil				

You will see that the Bengal gram grows well in loamy soil. Many crops grow well in loamy soil. Do all crops grow well in loamy soil?

Do This Activity

Collect information about the crops grown in your locality. Also find out the types of soil needed for each crop. Take the help of your teacher and parents. Record the findings.

Type of soil	Crops grown
Sand	
Loam	
Clay	

Different crops grow in different types of soil. To get a higher yield of a crop, the soil is made more fertile. Find out how this is done.

Do This Activity

Visit a farmer or a farmhouse. Collect information about what the farmer does to get a better yield of the crop. Ask him about preparing the field for sowing. Find out about the irrigation of the crops and selection of seeds. Also find out about the use of manures and fertilizers. Ask him how he protects the crops from insects and pests.

You may have found that farmers do not grow the same crop in the same piece of land, year after year. In one year if wheat is grown in a plot of land in the next year chana or matar is grown in the same plot. This is one way of maintaining the fertility of the soil. This is called *crop rotation*.

Did you also learn about crop protection? Spraying of chemicals is one method of protecting crops. How is it done?

You may know that gobar khad is a very good manure for the crops. Fertilizers are also mixed with the soil to make it fertile. To increase productivity, manures and fertilizers are added. What is the effect of a fertilizer on plant growth?

Do This Activity

Take some soil from a field. Put the soil in two pots. Take a pinch of fertilizer, dissolve it in water and pour it on the soil in one pot. Put small plants (or seeds) in both pots. Observe their growth over some days. Record your observations.

Plant grows well in the soil mixed with fertilizers. Urea is a common fertilizer and nitrates and phosphates are some other common fertilizers. Find out from a farmer what fertilizers are used by him.

The farmer may have also told you about the irrigation of the crops. Irrigation is important for crop yield.

Watering the crop increases crop yield. How does it happen?

Do This Activity

Take two pots. Put garden soil in them. Plant similar seedlings in each pot. Water the seedlings in one pot and do not water those in the other pot. Watch the growth of the plants in both the pots.



Garden soil holds just enough water for the plant to use. Different kinds of soil hold different amounts of water.

Do This Activity

Take three small pots of equal size. Take three small pieces of cloth. Put one piece across the hole in the bottom of each pot. Put sand in one pot, and an equal quantity of loam in the second and clay in the third. Leave about ten centimetres unfilled at the top of each pot. Press the soil down.



See that the surfaces are at equal distance from the top of the pots. Pour an equal amount of water into each pot. Collect the water that falls from the bottom of each pot, for 15 minutes. Which soil allows the most water to pass through it? Which soil retains the most water? Which soil allows the least water to pass through?

Sand allows the most water to pass through it. Clay soil holds a lot of water. Loam soil holds just enough water.

How is the crop yield influenced by the quality of seeds? Farmers use improved varieties of seeds. Seed stores are common in localities. Visit one such store. See also the method of seed preservation there. Note the way seeds are stored.

Quality seeds are important for better crop yield. They need to be stored properly. How is it done? In an earlier chapter you have learnt how grains are stored. How are they preserved?

Do This Activity

Visit a farmer's house. Observe how food grains are stored. Find out how the grains are stored in your home. Grains are stored in containers and bags. These are kept in a dry place. Sometimes naphthalene balls or neem-leaves are also put in the containers/bags. Sometimes chemicals are sprayed on containers/bags. Spraying keeps insects, bacteria, pests away. Have you seen D.D.T. being sprayed in your house or locality? Whenever there is an opportunity, see how it is done.

Discuss with your parents the ways of storing food grains and also their preservation.

Nowadays, water-proof and insect-proof containers are available. Try to make such a container. Describe what you would do to make one such container.

We depend upon soil. Soil is important for our survival. Without soil, life is not possible. It is our natural resource. You have learnt so many things about soil. Let us now understand how soil is formed.

You know that rivers flow from the mountains down to the seas. In this flow, water from the mountains brings down rocks with it. These rocks rub against one another. They become smaller and smaller, forming particles of soil. In this way, soil is formed.

How does the rubbing of rocks produce soil?

Do This Activity

Rub two pieces of rocks. Collect the powder that is formed. Examine the powder. Put it on a piece of white paper. Observe the powder with a hand lens. Does it look like sand? Does it look like clay?



Breaking up of rocks also produces soil. In nature, rocks also crack due to the sun's heat. During the rains, water gets into these cracks. The water freezes in winter, causing the rock surfaces to break.

Rocks also break up by falling. Have you seen a landslide?

Test Yourself

1. Complete the following sentences by using a suitable word given in the brackets.
 - i. _____ does not hold water for a very long time. (sand, clay, loam)
 - ii. _____ soil becomes wet and slippery after the rains. (sandy, clayey, loamy)
 - iii. _____ soil is good for plant growth. (sandy, clayey, loamy)
 - iv. When a lump of soil is dissolved in water, and then the solution is stirred, the _____ settles first. (sand, humus, clay, loam)
 - v. When a lump of soil is dissolved in water, and then the solution is stirred, _____ makes the water more muddy. (sand, clay, humus)
 - vi. When sand is stirred in a glass of water _____ floats on the surface. (humus, nothing, something)

2. Given below are some statements. Put a tick (✓) mark against the true statement and a cross mark against the false statement:—
 - i. Soil which contains humus is called loamy soil
 - ii. Humus is not made up of bits of dead leaves, plants and small animals
 - iii. Paddy grows better in clayey soil
 - iv. Growing different crops in different seasons is a way to maintain the fertility of the soil
 - v. Nothing is grown in sandy soil.

3. Questions (i) to (iv) below have four alternatives. Only one of them is correct. Put a tick (✓) mark against the correct answer.
 - i. Which type of soil retains more water
 - a. clayey _____ ()
 - b. loamy _____ ()
 - c. sandy _____ ()
 - d. humus _____ ()
 - ii. Which type of soil is best for making pots and toys
 - a. clayey
 - b. sandy
 - c. loamy
 - d. humans

- iii. Which type of soil hold the most water
 - a. loamy
 - b. sandy
 - c. clayey
 - d. humus
- iv. Clayey soil is best for toys because
 - a. it holds most water
 - b. it holds less water
 - c. it does not hold water
 - d. potters use this for making pots.
4. Complete the following sentences by filling in the suitable word/words.
 - i. Soil is our _____ resource.
 - ii. Soil is formed by _____ of rocks.
 - iii. Humus is made up of _____.
 - iv. Crop yield is increased by _____.
 - v. Humus makes soil more _____.
 - vi. Manures make soil more _____.
5. Name the different kinds of soil.
6. Write 10 sentences on the importance of soil.
7. Why should we conserve soil?
8. How do we depend on soil? Write 10 sentences.
9. Name the soil in which paddy grows well. Write about its colour, particle size and humus content.

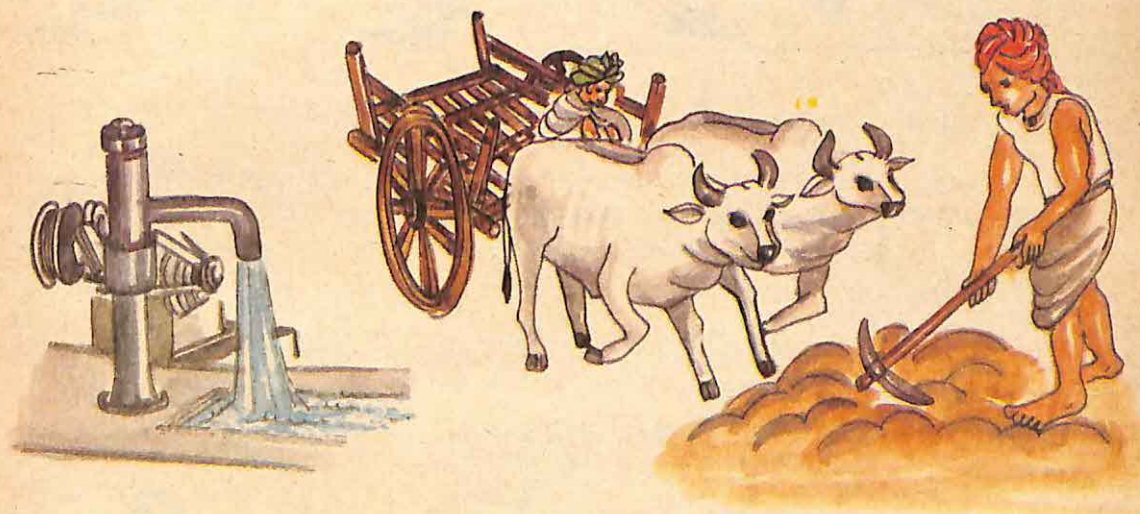
Things To Do

1. Collect information about fertilizers.
2. Collect soils of different colours. Observe their particle size. Write a few sentences about them.
3. Prepare a scale, a toy, from field soil. Make these with sand and clay. Describe which type of soil is most suited for the purpose.
4. Given below are the names of some crops. Find out the season in which it is grown. Also find out the type of soil in which they are grown. Wheat, Maize, Urad dal, Moong dal, Paddy, 'Jawar', 'Bajra'.

CHAPTER 11

Work, Force and Energy

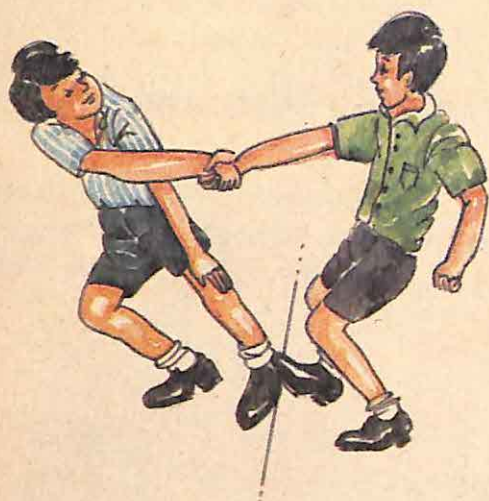
You have learnt that energy is the capacity to do work. All of us do work. Some people work in the fields. Some people work in the factories. Not only people, but animals and machines also do work. We apply force in doing work.



Do This Activity

Push a table and a desk. Are you able to push these objects? Now pull these objects one by one. Push an object. Try to pull it. Push a very heavy object such as a big piece of rock or a heavy box. Are you able to move all these objects? In pushing or pulling what did you do?

Now mark a line on the floor. Ask your friend to stand on one side of the mark. You stand on the other side. Hold each other's hand. Find out who can pull the other. Try it with another friend.



In this activity, what did each of you do? Did you apply force on each other? Did you feel exertion on your arms and muscles?

In pulling or pushing, you apply force. What happens when force is applied on a body at rest? Sometimes, it moves. Sometimes, it may not move. You could move a table but you could not move a big piece of rock.

What happens when force is applied on a moving body?

Do This Activity

Take a ball or a toy car. Make it move on the floor. Try to stop it. What did you do to stop it? Did you apply a force. If so, in what direction? Now roll the ball or the toy car again. Apply a force to make it move faster. What did you do? Did you apply a force in the direction of its motion to make it move faster?





In stopping a moving ball, you had applied a force in the direction opposite to its motion. In making it move faster, you had applied a force in the direction of its motion.

Give some examples of slowing down motion and speeding up motion.

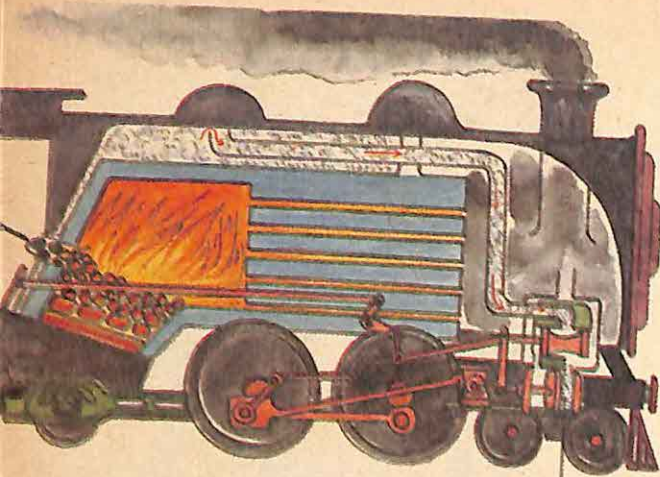
Look at the picture.

The girl is applying a force in the direction opposite to the motion of the calf. The motion of the calf is being slowed down.

Look at the picture.

It shows a train moving up a hill. One engine is unable to take the train up. It is unable to provide enough force to make the train overcome the inclination of the slope. Another engine is attached which helps the train to move up the slope. In the picture, the other engine applies a force in the same direction as the motion of the train.





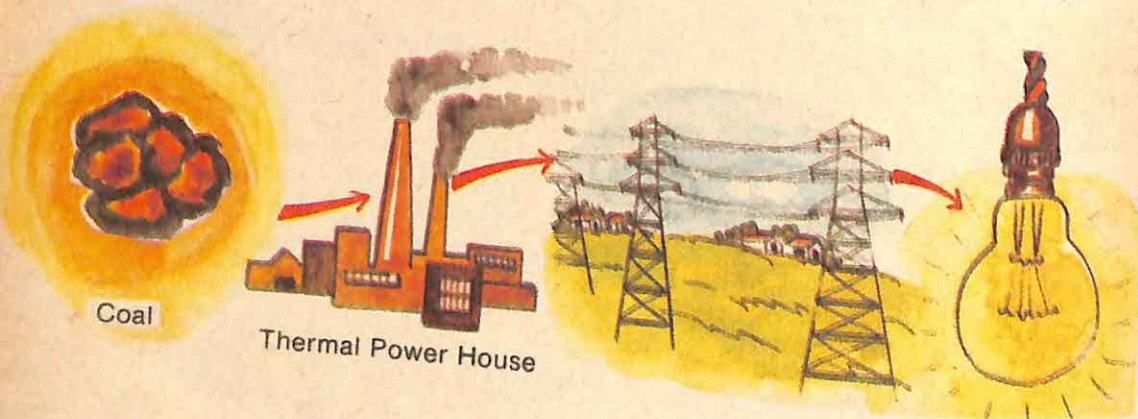
Look at the picture. It shows a steam engine pulling a train. What is the source of its energy? You know that to do work, energy is needed. You also know that our source of energy is food. Food gives us energy to do work. In a steam engine, steam is produced when water is heated. The steam pushes the piston which makes the wheels of the engine roll. The engine pulls the train.

Steam pushes the piston back and forth.

Therefore, heat is the source of energy of a steam engine.

Heat energy is used for cooking food, for melting metals, for warming a room in winter and for many other every day needs. List some other works which use heat energy.

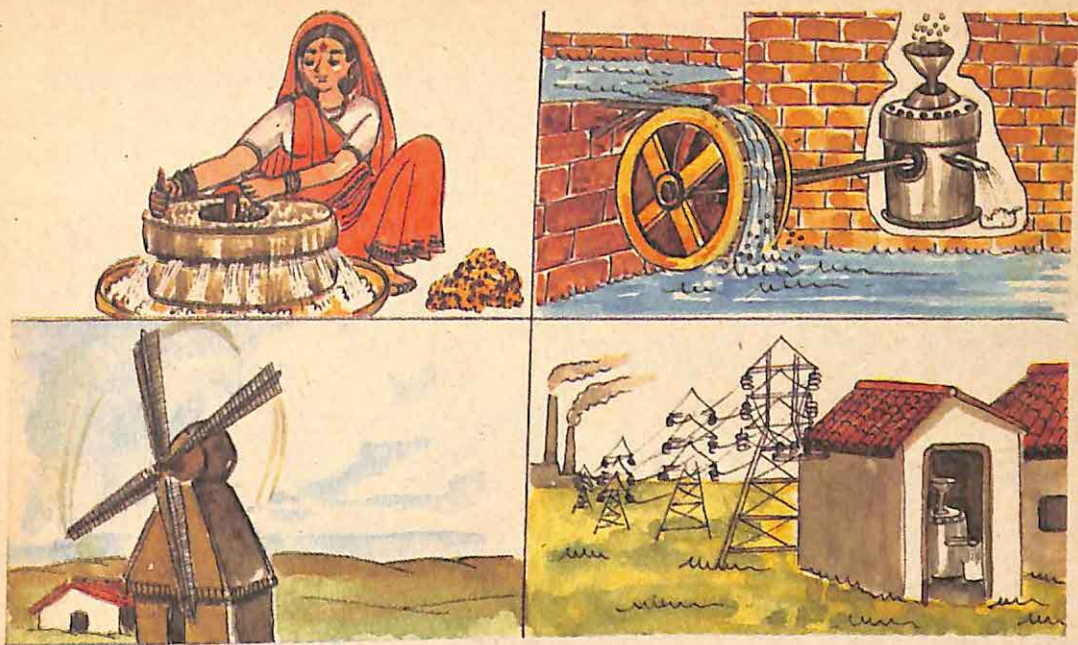
Look at the picture. It shows a thermal powerhouse. Fuel is being used to produce electricity. Heat energy is converted into electrical energy in a thermal powerhouse.



Electrical Energy is used in many ways. It is used to light our houses. It is used to drive machines in factories. Fans, Electric motors, grinding machines and tube wells work with electrical energy.

List some other works which use electrical energy.





Look at the picture. It shows different types of grinding machines.

The grinding machines can be operated by using different forms of energy. They can be operated by hand, and by using electrical energy. The grinding machines can also be operated by using the energy of moving water. This shows that the same work can be done by using different kinds of energy. We can understand this by doing an activity.

Do This Activity

Take a water-wheel. Move it by hand. Does it move? What is the source of energy?

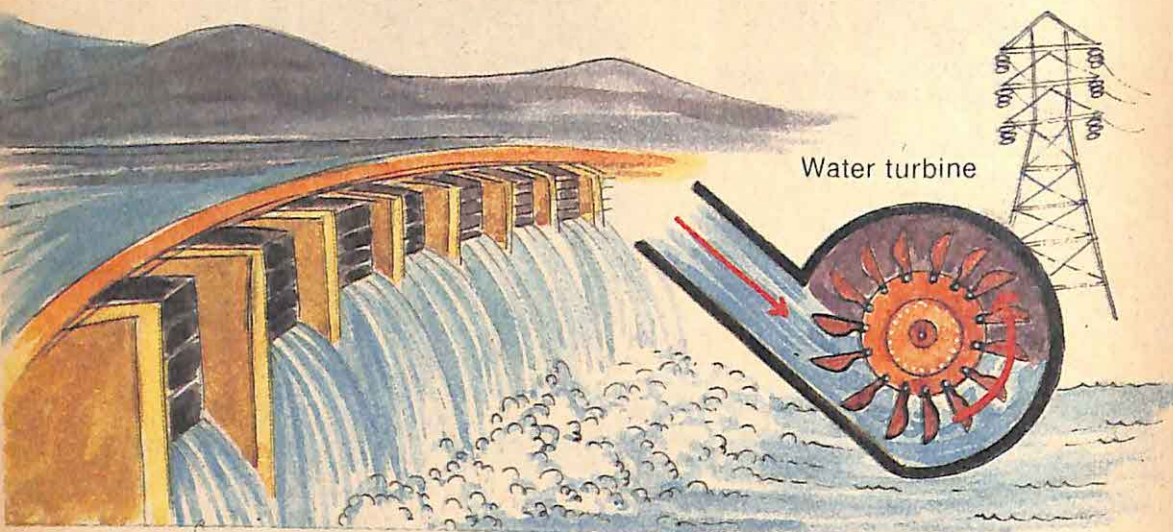
Now hold the water-wheel against falling water, as shown in the picture. Does it move now? What makes it move?

Can you tell which is the source of energy in each case? Moving water is a source of energy. Energy derived from moving water or when force is applied by hand are forms of mechanical energy.

Can the water-wheel be driven with the help of steam? Produce steam by heating water in a kettle. Hold the water-wheel against the steam. Steam can make the wheel move. What is the source of energy? Notice that the same work, for example, moving a water-wheel can be done with the help of different



kinds of energy. Have you visited a dam (bandh). In a dam, the energy of the falling water is used to produce electricity.



We use different kinds of energy to do work. We can identify the source of energy used in different activities. We can also tell whether the energy used is electrical, mechanical or thermal.

In the table we have given a list of some every day activities. You can add some more activities to this list. Say which kind of energy is involved in each activity.

Activity	Kind of Energy
i. walking	
ii. riding a bicycle	
iii. playing	
iv. lighting a room	
v. heating a room	
vi. cooking food	
vii. washing clothes	
a. by hand	
b. using a washing machine	

You will notice that energy in different forms is used to do different types of work. Thus, the same work can be done by using different kinds of

energy. Similarly, the same kind of energy can be used to do different types of work. List examples in daily life situations where one kind of energy is changed into another kind of energy for doing useful work.

Food, moving water, moving air, fuels are some of the source of energy. But from where does food get its energy? From where does moving air get its energy? Coal, petrol, diesel, kerosene and wood are common sources of energy. But, what is the source of energy of these fuels? Do you remember the cause of the 'water cycle'? Do you remember the role of the sun in the water cycle? Discuss this issue with your classmates, teachers and parents. The sun is the prime source of energy for all activities on earth.

Test Yourself

1. Given below are some statements. Put a tick (✓) mark against the true statement and a cross (X) mark against the false statement .
 - i. Energy cannot be changed from one kind to another.
 - ii. Force and energy are the same thing.
 - iii. The sun is not the prime source of energy.
 - iv. Moving water has energy to do work.
2. The following questions have alternative answers. Select the most suitable answer and put a tick (✓) mark against it.
 - i. Capacity to do work is
 - a. energy
 - b. force
 - c. power
 - ii. Food gives us
 - a. energy
 - b. force
 - c. power
 - d. strength
3. Complete the following sentences by filling in the suitable word or words.
 - i. In pulling or pushing one applies _____.
 - ii. Push and pull are examples of applying _____.
 - iii. If a body is in motion and one pushes it in the same direction of its motion, the body will _____.
 - iv. If a body is in motion and one pushes it in the opposite direction of its motion, the body will _____.
 - v. The sun is a _____ source of energy.

4. i. Write five sentences to explain that the sun is the prime source of energy.
- ii. Name five applications of mechanical energy, heat energy and electrical energy in our daily lives.
- iii. Write the effects of a force when applied on a moving body.
- iv. Write the effects of a force when applied on a body at rest.
- v. Describe the working of a water-wheel. Draw a diagram showing the parts of a water-wheel.
5. The following is a list of some objects and their sources of energy. Match each of them with a proper source of energy.

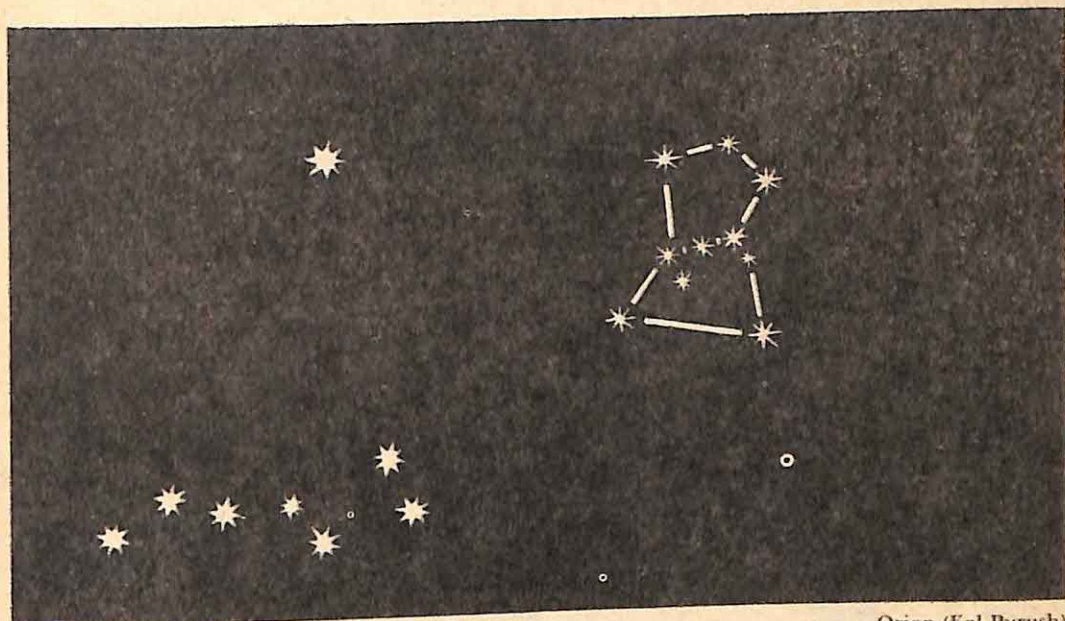
<i>Object</i>	<i>Source of Energy</i>
Clock	
Bullock-cart	
Bicycle	Electricity
Motor-vehicle	
Aeroplane	Moving water
Electric fan	Moving wind
Tube-well	Gun powder
Grinding machine	Battery cell
Railway engine	Fuel
Torch	
Radio	
Transistor	
Windmill	

Things To Do

1. Collect different type of toys. Study their working. Identify their source of energy.
2. Heat is used in many activities. Visit a place where heat is being used to do work. Describe one such work.
3. Study how a wrist-watch works. What is its source of energy?

The Sky and the Earth

On a clear night the sky looks so lovely. You see the brightly shining moon. You see the sky filled with stars. Some stars are seen in groups. You have learnt about one such group of stars. It is called the *Big Dipper*. A group of stars is called a *constellation*. The picture here shows some constellations.



Big Dipper (Sapta Rishi)

Orion (Kal Purush)

Look at the sky at night. Locate the Big Dipper (*Sapta Rishi*) or Orion (*Kal Purush*). Watch these constellations after every two hours. Do these constellations change their positions in the sky? Do they change their forms? The constellations are seen to move across the sky from east to west, without changing their forms.

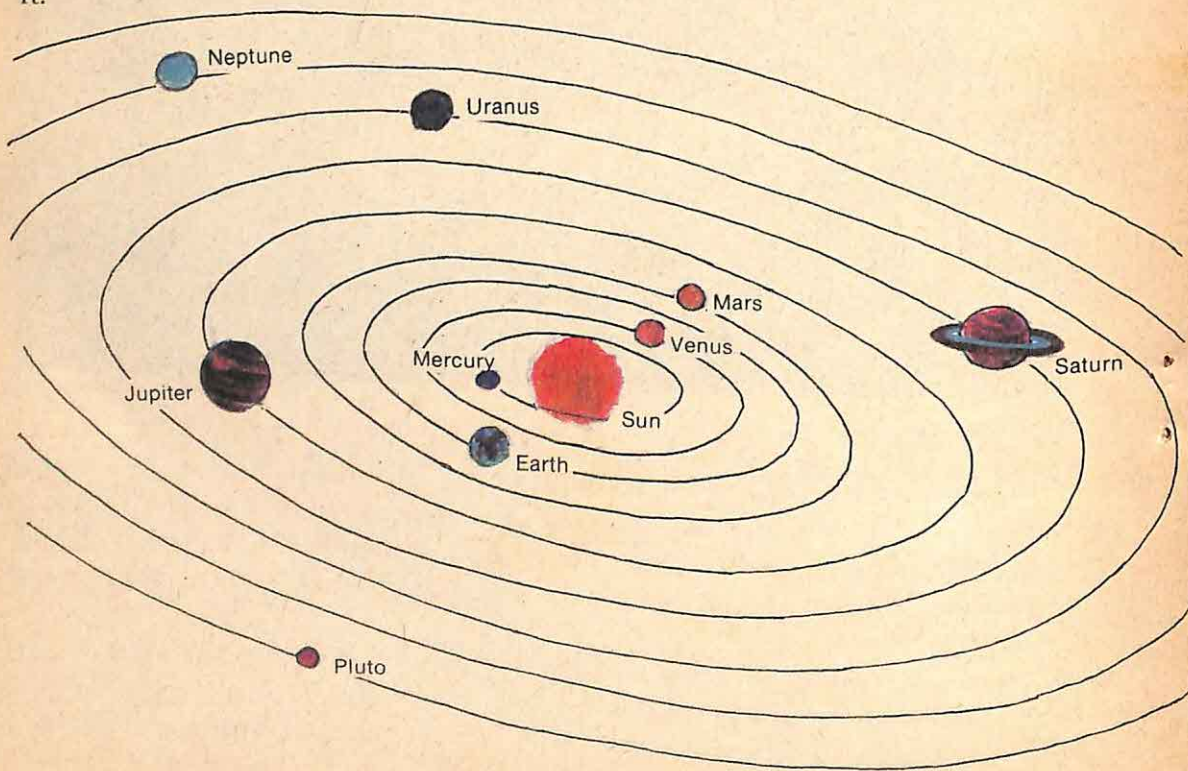
Look closely at the stars. Some stars twinkle, while others have a steady light. The stars which twinkle have their own light. They are huge balls of fire. They give off heat and light. They are like our sun. There are millions

and millions of 'suns' in the sky. But why do we not feel their light reaching us as heat? This is because they are much farther away from the earth than our sun. Our sun is also a star.

The sun is our nearest star. It gives us heat and light. Had there been no sun what would have happened on earth? The earth is a member of the family of the sun. In this family there are other members. All the members of the sun's family go round and round the sun in definite paths. These members, which revolve around the sun, are called *planets*. The sun and its planets form the *solar system*. Our earth is one of the nine planets of the sun's family. The path along which a planet revolves around the sun is called its *orbit*. Each planet takes a definite time to complete one revolution around the sun. How much time does earth take to complete one revolution around the sun? Let us learn about the other planets of the solar system.

Do This Activity

The picture here shows the sun with its nine planets. These are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. Which one of these planets is nearest to the sun and which one is farthest away from it?



Find out the Sanskrit names of these planets. Take the help of your teacher. The days of the week in Indian languages have been named after the names of some of these planets. Name those days of the week which have the names of planets. We can see some of these planets in the sky at night with our naked eyes. The planets have a steady light. They do not twinkle like the stars. Venus is seen in the sky, either at sunset or at sunrise, as a bright object. We call it either the Evening Star or the Morning Star. It is also called *shukra*. Try to locate it in the sky. The red planet is Mars. Ask your parents to help you to locate other planets in the sky. Like the earth other planets also rotate, in addition to going around the sun.

Planets revolve around the sun, but never collide with each other. Why?

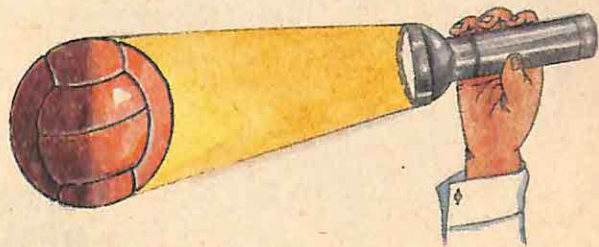
Do This Activity

Go out into the playground. Name one of your friends as 'Sun'. Select 9 more friends and assign them the names of planets. Ask the planets to go around the sun.

You know that the earth is a planet. It revolves around the sun. It also spins on its own axis. You must have played with a top. As you release the top it starts spinning on its axis. Watch a spinning top carefully. Observe its movement. It goes round and round itself. The rotational motion of the earth is somewhat like a spinning top.

The earth completes one rotation on its axis in twenty-four hours. The rotation of the earth causes day and night on earth. As we know night follows the day and the day follows the night. The sun rises in the east and sets in the west.

How does it happen?



Do This Activity

Take a big ball. Put it in front of a source of light as shown. Observe the part of the ball illuminated by light. Compare it with the part away from the light. What difference do you see? Put a cross mark on the lighted part.

Now rotate the ball about its vertical axis. What happens to the lighted part? Is it still lighted?

You can repeat this activity with a globe and a torch. You may darken your classroom. Imagine the globe to be the earth and the torch to be the sun. The lighted part of the globe has day. The dark part has night. Find out which countries are in the lighted part.

Now rotate the globe from the west to the east. Find out which other countries have day when the torch is directly shining on India.

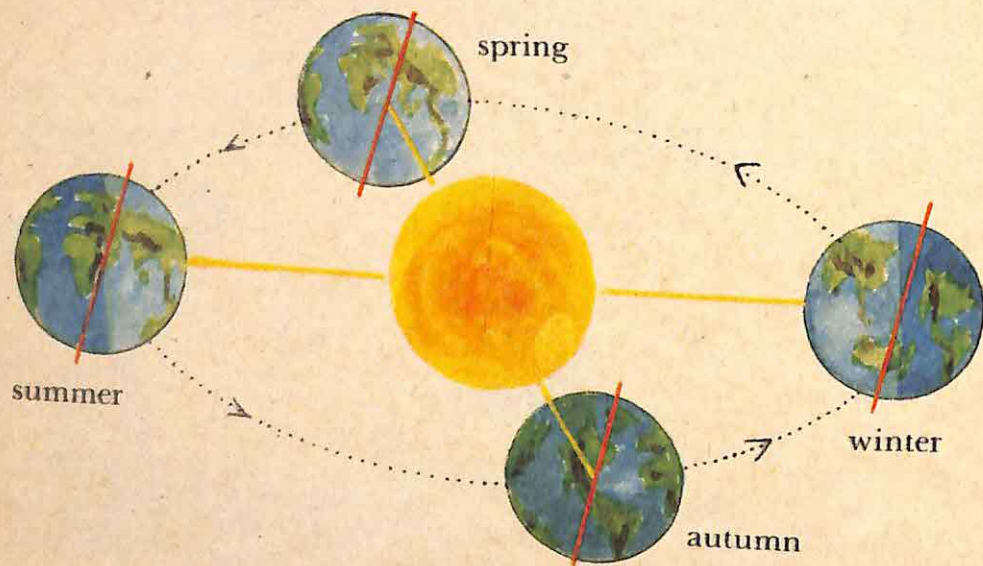
The rotation of the earth causes day and night. What changes take place on the earth due to the revolution of the earth?

Do This Activity

Make a list of the seasons in a year. Also write down the months against each season. Why do we have the same seasons in the same months of the year?

Just like day and night, seasons also follow each other. In a year, we have summer in certain months, and winter in certain other months.

This happens because the earth completes one revolution around the sun in one year. A year is divided into twelve months. In each year, in the same month, the earth comes back to the same position in its orbit around the sun. Look at the picture given below. It shows the position of the earth in winter, spring, summer and autumn.



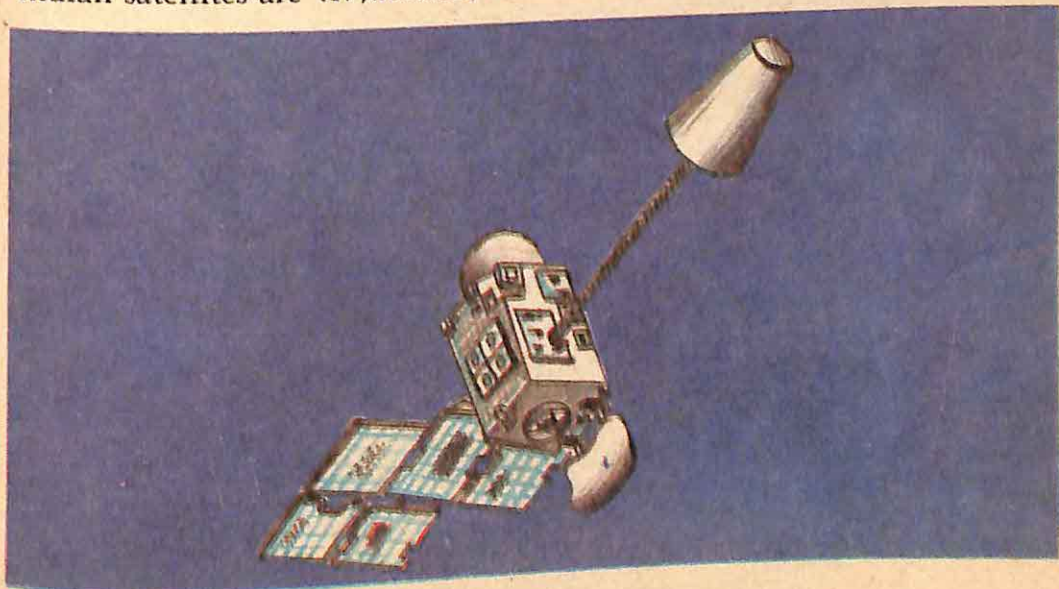
This is one of the causes of seasons. You will learn about the other causes later.

The moon is our nearest neighbour in the sky. You know that the moon seems to change its shape. Moonlight which you enjoy so much, is really not its own. We can see the moon because sunlight falls on it. If you observe the moon over a month you will find that the different shapes of the moon repeat themselves. After every 'Purnima' there is 'Amavasya,' followed again by 'Purnima'. Why does this happen?

The moon orbits around the earth. Any object that orbits around a planet is called its *satellite*. The moon is a *natural satellite* of the earth. The moon completes one revolution around the earth in 27.3 days. The moon is 3,75,000 kilometres away from the earth. In the sky, the full moon looks as big as the sun. Why? You know the sun is much farther away from the earth than the moon.

Other planets also have satellites. Jupiter has twelve satellites. All these are natural satellites.

We live in the space age. To know more about space, man has launched a number of man-made satellites in space. These are called *artificial satellites*. These satellites are also used for conducting scientific experiments. The weather satellites are used for forecasting weather. With the help of communication satellite we can watch television programmes 'live' from different parts of the world. Our country too, has entered the space age. India has launched many artificial satellites. Some of the important Indian satellites are *Aryabhata*, *Rohini* and *INSAT-1B*.



Test Yourself

1. Given below are some statements. Put a tick (✓) mark against the correct statement and a cross (X) mark against the wrong statement.
 - i. The bodies which revolve around the sun are called constellations.
 - ii. The sun is a star which is farthest from the earth.
 - iii. All planets revolve around the sun.
 - iv. The moon is an artificial satellite.
 - v. The moon does not have its own light.
2. Fill in the blanks with suitable words from the words given in the bracket.
 - i. Spinning around an axis is called _____. (revolution, rotation)
 - ii. A group of stars is called a _____ (solar system, constellation)
 - iii. _____ is also known by the name of Morning Star. (Jupiter, Venus)
 - iv. The _____ of the earth causes day and night. (revolution, rotation)
 - v. Stars appear small in size because they are _____. (small in size, far away from the earth)
3. Parts (i) to (v) of this question have four alternative choices. Only one is correct. Put a tick (✓) mark against the correct answer.
 - i. The solar system has
 - a. 6 planets
 - b. 7 planets
 - c. 8 planets
 - d. 9 planets
 - ii. A planet is a body which revolves around
 - a. Earth
 - b. Sun
 - c. Moon
 - d. Constellation
 - iii. The earth completes one rotation on its axis in
 - a. 20 hours
 - b. 24 hours
 - c. 28 hours
 - d. 32 hours
 - iv. The earth completes one revolution around the sun in
 - a. 12 months
 - b. 10 months
 - c. 8 months



- d. 6 months
- v. Jupiter has
 - a. 6 satellites
 - b. 8 satellites
 - c. 10 satellites
 - d. 12 satellites
- 4. What effects on earth are caused by its rotation and by its revolution around the sun?
- 5. Name the natural and artificial satellites of the earth.
- 6. Draw a picture of the solar system. Also label the planets.

Things To Do

- 1. Visit a planetarium, if possible, with your teacher.
- 2. Prepare a model of the solar system.
- 3. Observe the Big Dipper and Orion constellations in the sky. Draw pictures of these constellations.



राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING